UCLA Sustainability Action Research

2022 NFT Team Final Report: Evaluating the Sustainability of NFT Deals at UCLA

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ABOUT UCLA SUSTAINABILITY ACTION RESEARCH

Sustainability Action Research (SAR) is a student-initiated and student-facilitated research program run through UCLA's Institute of the Environment and Sustainability. During winter and spring quarters, teams of students are partnered with campus stakeholders to solve sustainability issues on campus and help UCLA reach its sustainability goals.

MEET OUR TEAM

TEAM LEADERS

Sally Min (she/her)

Sally is a third-year student at UCLA studying Environmental Science with minors in Environmental Engineering and Environmental Systems and Society. Her career in sustainability began when she interned at the Los Angeles County Sanitation Districts as an engineering intern. Her passion further developed when she got the opportunity to conduct field research in the Angeles National Forest to investigate the effects of climate change on the Douglas Fir trees. In her free time you can catch her baking, practicing modern calligraphy, attending RnB concerts, or playing doubles tennis with her twin sister.

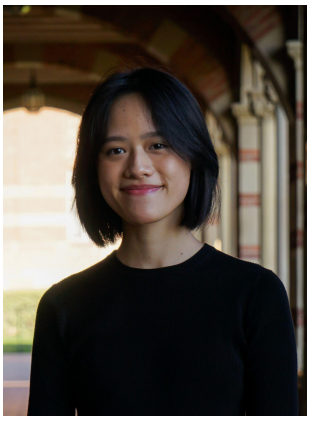
Jeff Van (he/him)

Jeff is a second-year UCLA student studying Environmental Science, with a concentration in Environmental Systems and Society. In addition to leading the NFT team, a major part of his experience at UCLA has been tackling single-use plastic waste and promoting more sustainable alternatives. His past and current involvements include the 2021 SAR Plastic Policy Team, the USAC Facilities Commission, and the IoES Corporate Partners Program. In his free time, he enjoys drawing, hiking, and playing the piano.

TEAM MEMBERS

Anya Desai (she/her)

Anya is a second-year environmental science major minoring in environmental systems and society. She is passionate about environmental justice and doing work that helps both people and the planet. Outside of SAR, she is involved with the Environmentalists of Color Collective and the UCLA Green New Deal. She also enjoys baking, reading, and going for walks.



Pei Xi Kwok (she/her)

Pei Xi is a third-year cognitive science and anthropology major at UCLA whose interests lie at the intersection of technology and impact. She joined the NFT team with the hope of better understanding the environmental impact of blockchain applications and the licensing perspective on NFTs.

Sofija Ninness (she/her)

Sofija Ninness is entering her third year as an Environmental Science major and Film Studies minor at UCLA. Her passion for sustainability began in Santa Barbara, CA where she grew up learning about the importance of protecting the environment. From taking classes in environmental studies to participating in sustainability focused internships, her experiences have influenced her decision to pursue a career path that incorporates sustainability and the creative arts. Outside of her studies, she enjoys exploring vegetarian restaurants, hiking in the Santa Monica hills, and playing beach volleyball.

Natalie Phan (she/her)

Natalie is a second-year Geography/Environmental Studies major and Environmental Systems and Society minor at UCLA. Her interest in the environment and sustainability began in high school when she worked on a native plant restoration project in San Diego, CA. Her participation in environmental science curriculum and conservation work has fueled her resolution in pursuing a career in sustainability. In her free time, she enjoys discovering new music, taking photos, and hiking.

MEET OUR STAKEHOLDER

Liz Kennedy (she/her)

Liz Kennedy is Director of Ethical Labor and Sustainability for UCLA Trademarks Licensing, a part of the Associated Students of UCLA, an independent, nonprofit student association responsible for retail, restaurant, student union, and trademark licensing operations at UCLA. Her work encompasses social and environmental sustainability and transparency with stakeholders, trademark licensees, and supply chain partners. Throughout her career, she has developed and run successful licensing programs at both public and private universities and has developed corporate social responsibility initiatives at a leading collegiate licensing service provider for multiple university clients. In this role she created tools, resources, and guidance for universities seeking to improve the social sustainability of their licensees and proactive management of labor and human rights risks. These included measurement tools, scorecards, assessments, and remediation strategies. Liz is a past president of the International Collegiate Licensing Association and currently serves on the nonprofit Fair Labor Association Board of Directors. Liz holds a Bachelor of Arts degree in Journalism from The Ohio State University and a Master of Business Administration from the USC Marshall School of Business. In her free time, Liz can be found outdoors, tending a California native plant garden habitat, and running, hiking, and exploring.

ABSTRACT

Non-fungible tokens (NFTs) are a relatively new phenomenon that have only gained popularity in the past few years. NFTs use blockchain technology to record digital transactions and ownership of digital assets. Recently, UCLA departments have received proposals to monetize UCLA's name and marks as NFTs. Although UCLA is a part of the agreement between the PAC-12 and NFT company RECUR established last year, it still has many questions and concerns about the sustainability of NFTs. Given the novelty of NFTs, existing literature is primarily concerned with the sustainability of Bitcoin, and not much research has been conducted in regards to the sustainability impacts of NFTs specifically. Thus, our research evaluated the environmental and social aspects of NFTs through interviews with NFT companies and universities, and focus groups with student-athletes. Results suggested that although there is a general awareness among NFT companies about sustainability challenges, environmental sustainability overall remains a weak point for the industry. Many universities are still learning about NFTs, and while sustainability is not a priority for most institutions, individuals with more technical knowledge of NFTs tend to be more wary about accepting NFT proposals. Finally, student-athletes believe that NFT deals will be reserved mainly for the top athletes, and when accepting NIL deals, they want to ensure that the company's values align with their own. We have compiled our data to create a rubric assessing the sustainability of an NFT deal, which will be used by UCLA, other institutions, and student-athletes when determining whether to accept an NFT proposal.

INTRODUCTION

NFTs are digital tokens stored on a blockchain linked to unique digital or physical items. Over the past five years, NFTs have dramatically increased in popularity, with some people treating them like collectibles such as fine art or trading cards. As NFT technology becomes more popular, the amount of NFT proposals received by UCLA has only increased. Currently, these proposals are directed towards the university's athletics department where athletes' Name, Image, and Likeness (NIL) can be monetized. At UCLA, NFT proposals have revolved around sports memorabilia and athletes, as opposed to fine art and artists which is more commonly seen in the NFT industry. UCLA's only official NFT deal at the moment is in conjunction with PAC-12, which has an NFT deal with RECUR (Pac-12, 2021). Given that NFTs are a rapidly growing and relatively new industry, there is a significant lack of attention to sustainability, energy consumption, and social impact. Our research evaluates these NFT deals to determine how they impact the university and its sustainability goals. Research methods include key-informant interviews, surveys, and focus groups. By the end of our research, our team will recommend whether NFT deals are sustainable and create a set of guidelines as to what criteria constitutes a sustainable NFT deal. This guideline will serve as a tool for UCLA Trademarks and Licensing and associated campus departments to balance sustainability concerns with the potential benefits of NFTs. In the long-term, our research may pave the way for further research into the sustainability of NFTs at a university level, and amendments in UC-wide policy.

In our preliminary research, we analyzed the various NFT marketplaces available and their current method for validating transactions on the blockchain. Proof of Work (PoW) stood out to be the most common method, and evidence points to its carbon footprint being exponentially higher than the Proof of Stake (PoS) model (see Appendix A for definitions of PoW and PoS). NFTs most commonly use Ethereum which currently runs through PoW, and so we must consider the carbon footprint of the PoW model when analyzing the environmental impact of an NFT (Calma, 2021). Additionally, payment alternatives to cryptocurrency such as credit cards when purchasing NFTs may also be critical in avoiding additional energy consumption from the minting and processing of cryptocurrency as a complement to the NFT. While it is difficult to precisely quantify the environmental impacts of various cryptocurrencies, there are many estimates of the energy consumption of Bitcoin, most notably the Cambridge Bitcoin Electricity Consumption Index (CBECI). Other studies have estimated the water and land footprints of Bitcoin and the amount of electronic waste generated by Bitcoin (Chamanara et al., 2021; de Vries, 2021).

Our primary variables of study include the attitudes of university licensing departments and any criteria they use to evaluate NFT sustainability; the attitudes of UCLA Athletics and individual athletes towards sustainability impacts and potential benefits of NFTs; and sustainability approaches used by NFT companies and to what degree have NFT companies quantified their own energy and carbon footprint.

METHODS

LITERATURE REVIEW

Our team first conducted a literature review of existing research surrounding NFTs. In this review, we focused on relevant UCLA policies that may pertain to regulating NFTs and their sustainability impact, existing NFT deals at other universities, and the sustainability impacts of blockchain technology.

UNIVERSITY LICENSING DEPARTMENT INTERVIEWS

We interviewed various representatives from different PAC-12 schools and affiliated organizations to get an understanding of their decision making processes when approving NFT deals and determine if sustainability was a factor. We chose to conduct informational interviews because we are able to gather more detail. Our interviewees included representatives from three universities in the Pac-12 conference, as well as two companies who represent universities in the collegiate licensing sphere. We initially contacted them via email to schedule one-hour interviews over Zoom, which took place between February 23 and May 20, 2022.

Of the questions asked, half were general questions regarding the considerations made when evaluating licensing proposals, their knowledge about NFTs, and their opinions about the PAC-12/RECUR deal. Then, we transitioned into questions around the sustainability impacts of NFTs. In order to prevent bias, our team avoided speaking about our findings or our opinions until after the interviews were completed. Interview questions for university

licensing departments and licensing companies can be found in Appendices B and C, respectively.

NFT COMPANY INTERVIEWS

In order to further understand the environmental and social implications of NFT deals, our team contacted and interviewed several NFT companies who have proposed deals with UCLA. These interviews served as an opportunity to directly ask NFT companies if they consider sustainability or track their social and environmental footprint. After researching growing companies in the industry, our team contacted five different companies and successfully established connections with two. After setting up Zoom meetings, our team interviewed these companies on May 2, 2022, and May 5, 2022, respectively.

Our interviews began with general questions about the company and later transitioned into questions regarding sustainability measures, including blockchain life-cycle assessment, carbon offsets, and renewable energy. Beginning our interviews with questions that established the company's current goals and plans allowed us to easily transition into more specific questions regarding their ESG plans.

In order to manage personal bias in our research, we formed objective questions that led into further discussion. To prevent confirmation bias, we formatted our questions to avoid "yes" and "no" answers. Similarly, the two companies that we interviewed were of different sizes and at different stages in their growth, creating variation in our results that will be more representative of the NFT industry. Finally, we standardized our results by using the

same set of questions across both interviews. See Appendix D for questions asked in these interviews.

FOCUS GROUPS

Since most collegiate NFT deals are currently centered around athletics, we decided to hold focus groups of student athletes. We recruited athletes by posting a survey in the dorm buildings on the Hill, and then selected athletes based on their availability. We tried to ensure that we were selecting athletes from multiple NCAA sports teams (televised and Olympic sports) to ensure a diverse and representative set of responses. Ultimately, we ended up interviewing five athletes from the football, rowing, and swim and dive teams in two one-hour sessions on May 18, 2022, and May 19, 2022. To limit bias in responses resulting from the fact that some athletes knew each other, we ensured that all participants understood that all responses would remain confidential and anonymous and that there were no right or wrong answers to our questions.

We designed questions with five goals in mind: to better understand student athletes' perspectives on NFTs and NFT deals, their priorities and deal breakers when deciding upon NIL deals, the considerations they make regarding the environment and sustainability, their thoughts on the environmental implications of NFTs, and their perspectives on EDI components to NIL/NFT deals. See Appendix E for our focus group questions.

INCORPORATING EQUITY, DIVERSITY AND INCLUSION

To include principles of Equity, Diversity, and Inclusion (EDI), we took into consideration the opinions of student athletes, who should be included in conversations concerning the use

of their Name, Image, and Likeness. For example, one athlete had raised the concern of student-athletes being exploited with NFT deals from their lack of knowledge about the crypto-currency world. Since student athletes are receiving the bulk of collegiate NFT deals, we want to ensure that they are being educated on all aspects and that their concerns are taken seriously. NFT deals are mainly discussed amongst the licensing department and within the institution itself, so we would like to make student voices heard. By gathering their opinions on the matter of NFTs and sustainability, we are collecting a diverse range of viewpoints and making sure that all parties involved in NFT deals are being included and represented.

CHALLENGES

NARROWING SCOPE

One of our challenges was about narrowing the scope of our project. NFTs would be able to generate revenue for a wide variety of groups, including student athletes who want to monetize videos or images of them in action, student artists who want to gain a revenue stream, and UCLA academic departments who wish to auction off notes pertaining to groundbreaking research. Given that most university NFT proposals and deals are currently geared toward student athletes and the limited amount of time we have to complete this project, we ultimately decided to focus on the role NFTs can play in college athletics. Since we want to ensure that our research is relevant for the entire UCLA campus, we have designed our rubric so users from all departments can extrapolate the sustainability impacts of NFTs. This will ensure that there is at least a baseline about the role of NFTs and sustainability that can be extended to other campus stakeholders other than athletics.

LACK OF EXISTING RESEARCH

Another obstacle we faced throughout this quarter was the general lack of existing research on NFTs and their sustainability. As a result, most of our literature review used Bitcoin and other cryptocurrency platforms as a proxy to establish a baseline on the sustainability of crypto. Along with this lack of research, we also encountered a shortage of public awareness surrounding NFTs and their sustainability issues. Given that NFTs are a niche and complex topic with a significant amount of technical jargon, we first educated

ourselves on how NFTs and blockchains work so that we better understood how to evaluate an NFT's sustainability. Given that much of the jargon is not common knowledge, we ensured that our spring quarter focus groups had the correct balance of context to ensure that respondents are not biased.

CONTACTING NFT COMPANIES

A third challenge was establishing contact with the NFT companies we wished to interview. Initially, our research revealed growing companies in the general NFT space and university sports NFT space that could provide us direct insight into the industry.

The first round of challenges began when we tried to contact these companies. There was minimal information on how to contact them or who to reach out to for our interviews. With the help of our stakeholder, we obtained contact info for individuals at five different companies.

The next challenge was getting responses from these company representatives, as only two of the five responded to our inquiries. While the low response rate was unexpected, it prompted us to conduct efficient and professional interviews with the two companies that did respond so as to get the most information possible.

COORDINATING FOCUS GROUPS

Originally, we had hoped to recruit athletes through the Athletics Department to ensure all NCAA sports teams were contacted in the hopes of having one representative from each sports team. However, due to the limited amount of time we had for data collection, we faced logistical barriers when trying to develop a formal partnership with UCLA Athletics.

Therefore, we shifted our recruitment strategy to using surveys posted near common areas of dorm buildings on the Hill, as these are buildings members of our team had access to. Due to security issues, we were unable to enter any UCLA or privately-owned apartment buildings to recruit athletes who may live in these buildings.

RESULTS

Note: We have removed the names of individuals and institutions from our findings, and instead framed our responses to highlight overarching trends that are reflective of the collegiate licensing and NFT spaces as a whole. We have done so in order to allow our interviewees and focus group respondents to give candid responses, to protect the confidentiality of internal operations and data, and to avoid influencing licensing decisions for or against a particular company.

UNIVERSITY LICENSING DEPARTMENT INTERVIEWS

Universities Are Still Learning About NFTs

Most university representatives still lack substantial knowledge about NFTs. Many were still learning about how NFTs work and what their environmental impacts are. In particular, one interviewee mentioned consensus mechanisms, carbon credits, and green energy as areas where their institution lacks a detailed understanding. Another interviewee's department includes a sustainability question in their evaluation of licensees, but feels it is too broad and should be more specific to truly gauge a NFT company's commitment to sustainability.

Some institutions have taken actions to better understand NFTs' function and sustainability impacts. Two universities had working groups to try and understand more about NFTs, while another interviewee mentioned that they have an employee whose main objective is to evaluate the sustainability of licensing deals.

Institutions Are Not Prioritizing Sustainability in NFT deals

All interviewees felt that business concerns were defined as the top priority for all institutions. Licensing departments and their equivalents have a more business- and marketing-centric mindset, and sustainability was not a top priority when it came to evaluating NFT deals. One interviewee prioritized profit, product availability, and cooperation as major considerations that take precedence over sustainability concerns. Another stated that their staff tend to work more on the marketing side and are not as familiar with technical aspects. A third admitted that the environmental impacts of NFTs are not a dealbreaker when it comes to approving NFT deals.

For the most part, the collegiate licensing industry is looking in reactive, not proactive ways; in other words they are looking at the present and not thinking about the future of the environment and NFTs. This was illustrated by one company which mostly trusted the companies' commitment to sustainability and will evaluate the impacts down the road.

Attitudes Towards NFTs Varied

Attitudes towards NFTs varied among our interviewees. Some institutions and companies were more comfortable with NFTs and NFT deals despite the sustainability impacts. In particular, university representatives appreciated when NFT companies were transparent and willing to explain their product. In addition, universities may be less concerned about NFT deals if major reputable organizations, like the Pac-12 conference and Collegiate Licensing Company, find NFT companies to be trustworthy.

On the other hand, some individuals had a more negative view of NFTs. They were more suspicious of their sustainability impacts and more hesitant towards NFT deals. In general,

these individuals tended to have a more detailed understanding of the energy consumption of different consensus mechanisms, including PoS blockchains and sidechains (see appendix A for definition of sidechains). A commonly raised concern was that the NFT companies themselves have a lack of understanding about sustainability concerns. Universities stressed the need for more accurate and detailed information regarding NFTs' impacts in order to move forward with a deal. In addition, these individuals felt that the industry overall is not at a point where most NFT companies prioritize using PoS. Once Ethereum shifts to PoS, this will alleviate most concerns about environmental sustainability and energy consumption; however, this shift has been delayed repeatedly and university representatives were unclear of the exact timeline. Interviewees also felt that with continued pressure from universities and affiliated organizations, NFT companies will be encouraged into improving their sustainability.

Carbon credits were another major point of discussion. Most universities did not know much about carbon offsets; however, some interviewees expressed a negative view. In particular, there were concerns that carbon credits were purely for optics, or that NFT companies would not have a monetary incentive to invest in them.

Common Trends in Decision Making

Universities also shared some criteria they used to evaluate NFT sustainability. Overall, the blockchain's consensus mechanism was their primary consideration, and interviewees agreed that it is the most effective step to mitigate the energy consumption issue of NFTs. Another criteria was measuring the energy and carbon footprint of NFTs. A third point of attention was the payment options provided by a company. Some companies allow

purchases via credit card, a less energy-intensive method compared to cryptocurrency. Other considerations included the company's years of experience and their commitment to responsible innovation.

NFT PROVIDER INTERVIEWS

Through our conversations with the potential licensees, we found that efforts towards sustainability are inconsistent across the NFT industry, indicating that there is still more to be done to make addressing the environmental impact of NFTs a priority for companies. The entities are clearly aware of the challenges with energy consumption inherent to the technology, echoing the team's learnings regarding PoW energy advantages over PoS validation methods. However, the extent of the measures taken to learn and address these challenges vary from one company to another. In comparing the two companies, Company B appeared to have taken more measures towards addressing the sustainability challenges of NFTs, which is likely attributable to the differences in scale of operations, with Company A operating on a smaller scale than Company B. Neither of the companies had fully dedicated sustainability personnel, though Company B expressed that there was a group of individuals in the organization for whom the majority of their work was dedicated to sustainability.

Both companies highlighted their use of the Polygon blockchain in the NFT minting process as part of their sustainability efforts. Company A's platform is primarily built on Polygon, while Company B is blockchain agnostic, meaning that its platform is compatible with Polygon. As mentioned in Appendix A, Polygon as a sidechain of Ethereum utilizes a Proof of Work consensus mechanism, while also allowing for the movement of assets onto

Ethereum as the main chain. This means that consumers of NFTs minted by both companies are able to access Ethereum, the most popular chain for NFTs while reaping the energy benefits of Proof of Work validation methods.

On the other hand, investment into energy monitoring and sustainability reports regarding the company's own energy consumption was more varied. Company B shared that they had previously partnered with a third party environmental reporting service to calculate and verify emissions. They found that the energy consumption arising from operational activities and NFT minting for that partnership alone was 11,639.72 kWh. In comparison, Company A had little to no insight on their energy data, though they mentioned a sustainability report as a possibility in the next one to two years. When asked about the possibility of a life cycle assessment, both companies expressed that they had not conducted one but were open to it.

Similarly, measures to mitigate environmental impact, such as carbon offsets and the incorporation of renewable energy sources into energy supply, were employed to differing extents by the two companies. Company B shared that they had purchased around 1,300 tonnes of carbon offsets, of which Polygon accounted for 2.98 tonnes, while Company A expressed that they were aware of some of their server farms being powered exclusively by renewable energy sources. Additionally, both companies also brought up the fully digital and remote aspect of their operations as a contributor to overall lower energy consumption.

Taking into account the findings above, it is perhaps most critical that both companies were cognizant of the limitations of their current efforts and the need to do more. When discussing their purchase of carbon offsets, Company B demonstrated an awareness of the challenges of using carbon offsets such as verifiability and transparency, and repeatedly expressed the company's commitment to sustainability as a core value since its founding. On the other hand, despite having less substantial answers to questions on mitigating measures, Company A was forthright in conveying that their small size prevented them from immediately prioritizing sustainability, but that they had plans to initiate a sustainability roadmap in the future.

Ultimately, however, our findings are limited by the fact that we were unable to speak to more companies. Consistent efforts from both the team and our stakeholder in reaching out to company representatives were unsuccessful, which signals a general unwillingness from players in the industry to broach the topic of sustainability challenges of NFTs. Based on the interviews, the team also suspects that sustainability is increasingly being used in the NFT industry as a marketing ploy, raising concerns of greenwashing.

FOCUS GROUPS

Initial Lack of Awareness of NFTs

Through these focus groups we learned that student-athletes did not understand extensively about NFTs. Most had only vaguely heard of it and less than half expressed they were aware of its application in art and sports. However, after a brief overview of the topic, athletes did see some potential in collegiate athletics NFT deals.

Across the board, all of the athletes had the assumption that environmental impacts of NFTs would not be high. One participant said that digital art seems less energy-intensive than physical art because digital art "is not a tangible product requiring material and labor." Another participant said that in terms of sustainability, NFTs seem "better than paper trading-cards that have actual physical waste."

Athletes also thought these NFT deals would not impact the average student athlete, but would affect those in more lucrative televised sports. From those sports, only a fraction of the players will likely be successful. If approached by an NFT deal, some students were open to exploring the deal while others were not.

Non-Financial Consequences of NFT/NIL Deals

When it came to signing NIL deals, athletes wanted to ensure that companies that are approaching them possess values that align with theirs and that "it is a product [they] actually use and are comfortable promoting". Some also brought awareness to and commended other athletes for using NIL deals to work for a social cause such as feeding or clothing the homeless.

Interestingly, one of the concerns became that the new marketplace or culture of having an NFT in every athlete's name would spark a popularity contest where athletes would begin to compare themselves to their peers for selling less. For example, if everyone in the swim and dive team created a collection of NFTs in their name, they would be inclined to(?)compare differing sales and valuations. This raises the concern that college athletics would become less about the sport, and more about marketing and sales.

Another concern was ensuring that NFTs represented the athletes appropriately. In particular, members of the women's swim and dive team voiced concerns about potential NFTs representing them in swimsuits. They wondered who might find this NFT desirable and questioned the audience and consumers that might buy images of only women in swimsuits.

FINAL DELIVERABLE

We will be providing a rubric, glossary of key terms, and sample questions to ask NFT companies to UCLA Trademarks and Licensing. This deliverable will provide a simple and visually appealing method of understanding the different sustainability components of NFTs, as well as a framework for evaluation. The rubric will evaluate different criteria mentioned in our team's questioning as well as other items used by our interviewees. Each criterion will be ranked from least to most sustainable. After each criterion is evaluated, the rubric will provide a complete picture of each NFT's progress towards sustainability and allow UCLA Trademarks and Licensing to decide whether or not to move forward with a deal. To help users understand the complex technical concepts, the deliverable will also contain a glossary of terms concerning technical aspects of NFTs and explain how NFTs work. See Appendix F for our deliverable and reasoning behind each criterion.

DISCUSSION

SIGNIFICANCE OF OUR FINDINGS

Our research contributes to the creation of environmentally sustainable practices in collegiate athletic licensing by providing the informational groundwork for licensing professionals to make sense of sustainability in NFT deals. It is difficult for many to understand the inner workings behind novel technologies such as NFTs and blockchain, and our work helps to illuminate the aspects of NFTs that are most relevant to decisions surrounding sustainability. Beyond that, our work informs UCLA's approach to blockchain and NFTs as a university and its utilization of such technologies in the future. More broadly speaking, the study of sustainability in NFTs pulls focus towards the larger conversation surrounding the environmental parameters of web3 technologies and the measures needed to handle their burgeoning energy demand.

IMPLICATIONS FOR THE COLLEGIATE LICENSING AND NFT INDUSTRIES

Most collegiate licensing professionals are aware of the environmental impact of the NFT economy, but do not have a fully-formed opinion on how to handle licensing proposals from NFT companies. Much like UCLA, other university licensing departments are still very much in the learning phase of NFTs as a product, and the role of sustainability in the decision-making process for approving NFT proposals remains to be seen. It is thus essential that UCLA works alongside other institutions to assert accountability and hold potential NFT licensees to a standard of environmental sustainability. As seen from our

interviews with NFT companies, there are measures that can be taken towards building a more sustainable NFT economy, but companies will only implement them if there is demand for it. In addition, student athletes are a key stakeholder in the creation and selling of NFTs, yet are often neglected and uninformed of their environmental impact. The findings from our focus groups shed light on their unique perspectives towards NFTs and NIL deals.

DIRECTIONS FOR FUTURE RESEARCH

As the first research team on campus to study the sustainability of NFTs, our scope was limited to exploring the sustainability of NFT proposals in the context of athletics. Future groups may choose to focus on various other avenues to evaluate the role NFTs can play for the larger collegiate environment. This can take the form of evaluating the sustainability of NFT deals and proposals for student artists, especially considering that many of the most famous NTFs have been digital pieces of art, or evaluating the role NFTs may play in representing research notes or publications from award-winning faculty. Future projects may also decide to explore the usage of NFTs as micro-credentials that store information contained on ID cards or show proof of diploma. Future teams may adopt a more technical approach and conduct a life-cycle assessment of an NFT to determine the exact steps in the process of minting, selling, or buying that can be made more sustainable. They may also wish to investigate the sustainability impacts of other consensus mechanisms, such as proof-of-history.

ACKNOWLEDGEMENTS

The NFT team would like to thank the following people for their guidance over the past six months as we conducted our research. First, we would like to shout out our stakeholder, Liz Kennedy, Director of Ethical Labor and Sustainability for UCLA Trademarks and Licensing, for her mentorship and advice as we conducted our research. Next, we would like to thank the SAR Directors Phoebe Chiu and Maddie Wilson, the SAR Communications Directors Eric Ha and Ruhena Randhawa, as well as the SAR Faculty Advisors Carl Maida and Cully Nordby for their patience, guidance, and help in navigating setbacks. We would also like to thank Nurit Katz, Chief Sustainability Officer at UCLA, and Bonny Bentzin, Deputy Chief Sustainability Officer at UCLA, for their support in conducting our research. Finally, we would like to thank everyone who participated in our informational interviews and focus groups for sharing their insights and perspectives on the intersection between NFTs and sustainability.

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APPENDIX A:
DEFINITION OF KEY TERMS

Bitcoin: A popular cryptocurrency which uses the Proof-of-Work consensus mechanism.

Blockchain: a shared, distributed digital ledger which can facilitate the recording of transactions, including for payments, orders, and assets. Transactions are recorded in the form of "blocks", which are connected together to form a blockchain. Transactions cannot be tampered or modified once placed on the blockchain (IBM, n.d.).

Carbon Credit / Carbon Offset: Certificates which individuals or groups can purchase to fund projects that lower carbon dioxide emissions elsewhere, as opposed to on-site. Examples include reforestation and renewable energy projects (Gurgel, 2020).

Consensus Mechanism: a mechanism used to verify transactions on a blockchain system. Common consensus mechanisms include proof-of-work (PoW) and proof-of-stake (PoS), with PoS being a newer consensus mechanism.

Cryptocurrency: a decentralized digital currency which uses blockchain technology to record and verify payments between parties. Cryptocurrencies are not backed by a central bank or government; instead, transactions are verified using a consensus mechanism (Frankenfield, 2021).

Ethereum: The most popular blockchain for minting NFTs which uses the Proof-of-Work consensus mechanism.

NIL: refers to an NCAA policy that allows student-athletes to use their Name, Image, and Likeness for compensation when promoting non-institutional, commercial, or charitable entities (UCLA NIL Policy, 2021).

NFT: non-fungible token, or digital tokens stored on a blockchain linked to unique digital or physical items.

NFT Provider: A company proposing deals involving NFTs to UCLA and other universities

Pac-12: a collegiate athletic conference with 12 member schools.

Proof of Stake: a consensus mechanism in which users must provide proof of a "stake" in the form of cryptocurrency tokens to validate transactions (Calma, 2021).

Proof of Work: a highly energy intensive consensus mechanism in which crypto miners use servers that solve complex problems in order to validate a transaction and add a new block to the blockchain (Calma, 2021).

Sidechain: a smaller blockchain linked to a larger blockchain, allowing users to transfer their assets between the chains. Advantages of sidechains include faster transaction speeds and lower fees (Fields, 2021). An example is Polygon, a PoS sidechain which NFT companies are using to reduce the energy consumption of minting. However, since Polygon still registers transactions on Ethereum, a PoW chain, the environmental impacts may be higher than companies may claim (Frost, 2022).

APPENDIX B

INTERVIEW QUESTIONS FOR UNIVERSITY LICENSING DEPARTMENTS

Introduction

May we record today's meeting? This is only for our team and will not be shared with anyone else.

Thank you for taking the time to speak with us today.

My name is [NAME], and I am a member of the student-led NFT Research Team from UCLA's Sustainability Action Research (SAR) Program. The SAR Program is a student-initiated research program that partners student research teams with a campus stakeholder to solve sustainability issues on campus. Our project this year is concerned with evaluating the environmental sustainability of NFT proposals at UCLA. We are working with Liz Kennedy, Director of Ethical Labor and Sustainability from UCLA Trademarks and Licensing to create a set of guidelines advising the UCLA campus community on the sustainability impacts of these deals.

General Questions

1. Can you briefly describe your role as Licensing Director and the scope of your work?
2. What aspects do you consider when evaluating licensing proposals? (e.g. the art, sustainability, financial aspects, etc.)
3. How has [university] handled NFT proposals?
4. Which departments have received NFT proposals?

NFTs at [University] + Pac-12 Deal with RECUR

1. How was [university] going into the deal [between Pac-12 and RECUR]?
2. How has [university] been monitoring the sustainability impact of the deal?
3. Who are the others on campus who think about NFTs? What do the other departments on campus think about NFTs?
4. What has the reaction been (either positive or negative)?

Sustainability of NFTs

1. What is your current understanding of sustainability and NFTs?
2. Has anyone on campus raised the question of sustainability?
    a. Who is leading the charge on that conversation?

   b. How have individual athletes responded to NFT proposals?
   c. What have you learned from others at [university] you have consulted with regarding NFTs (e.g. researchers)?
   d. What other departments, if any, are involved in NFT approvals?
      i. What has their reaction been? POVs from the marketing and purchasing department, i.e. the people he works with, to approve licensing agreements
3. What criteria, if any, are you using to evaluate NFT sustainability when approving deals?
   a. What aspects of sustainability are you considering? (energy consumption? E-waste? ESG factors like labor and ethics?)
   b. What are your thoughts on NFTs that use the Proof-of-Stake mechanism? Carbon credits? Green energy?
   c. Given that NFTs are decentralized, there is a lack of accurate data with regards to energy consumption, location of NFT minting devices, e-waste data, etc. How are you working with the lack of information, and has this been an obstacle in your decision making?
4. Can NFTs be sustainable?
   a. How big of a role do you think NFTs will play in university merchandising? Do you believe that it is here to stay on our campuses?
   b. Is the environmental impact of NFTs a deal breaker when it comes to approving licenses?
   c. How have you reconciled the environmental impacts of NFTs with financial incentives for athletics?

APPENDIX C

ADDITIONAL INTERVIEW QUESTIONS FOR LICENSING COMPANIES

Introduction

May we record today's meeting? This is only for our team and will not be shared with anyone else.

Thank you for taking the time to speak with us today.

My name is [NAME], and I am a member of the student-led NFT Research Team from UCLA's Sustainability Action Research (SAR) Program. The SAR Program is a student-initiated research program that partners student research teams with a campus stakeholder to solve sustainability issues on campus. Our project this year is concerned with evaluating the environmental sustainability of NFT proposals at UCLA. We are working with Liz Kennedy, Director of Ethical Labor and Sustainability from UCLA Trademarks and Licensing to create a set of guidelines advising the UCLA campus community on the sustainability impacts of these deals.

General Questions

1. Can you briefly describe your role [at company] and the scope of your work?
2. What is the nature of [company]'s relationship with [UCLA Athletics/UCLA/other universities]?
3. Who comprises your direct client base? (Are you a representative for UCLA Athletics in conducting deals?)
4. What is your current understanding of sustainability and NFTs?
    a. What aspects do you consider when evaluating licensing proposals? (e.g. the art, sustainability, financial aspects, etc.)
    b. Transitioning to some more NFT-specific questions, have you been part of the decision making process of any NFT deals?

Pac-12 Deal with RECUR

1. How big of a role do you think NFTs will play in merchandising? Do you believe that it is here to stay?
2. How did [company] feel going into this [RECUR] deal? Did you feel you had sufficient knowledge?
3. What was the process in making this deal happen?

4. How involved were you in approving this deal?
5. What aspects/priorities were considered by the different parties when evaluating or creating the deal?
6. What were some of the concerns that were brought up?
7. Was there a concern about how the deal's environmental impacts would reflect on the team's image?
8. [If applicable] What is your company's relationship with individual athletes?

NFTs by Sport [If applicable]

1. What is your perspective on NFTs potentially increasing the revenue generation capabilities of "Olympic sports"? e.g. gymnastics - Katelyn Ohashi's virality and how she/UCLA can capitalize on that.
2. Basketball is the sport that has had the most success in the larger NFT market with NBA Topshot - is that also being reflected in collegiate athletics?
3. How has the deal impacted different sports teams/what are the differences in how mens/womens/mixed teams have been affected?
4. How have individual athletes responded to NFT proposals?
5. Can NFT deals be viewed as a way to make up for lost revenue during the pandemic? i.e loss of ticket sales due to the pandemic.

Sustainability of NFTs

1. One major concern about NFTs is the environmental impacts associated with them, including the energy consumption. How does [company] feel about the sustainability concerns of NFTs?
2. Has the question of sustainability been raised? If so, who is leading the charge in that conversation?
3. How have you seen other schools respond to NFTs?
4. Is the environmental impact of NFTs a deal breaker when it comes to approving licenses?
5. How have you reconciled the environmental impacts of NFTs with benefits for UCLA Athletics? (i.e are the environmental impacts worth the gains for UCLA)
6. Possibility of UCLA Athletics offsetting carbon emissions of NFTs / whether there are any measures that can be put in place
7. Have you taken any steps to evaluate the sustainability impact or mitigate it?

Additional Follow Up Questions

1. How is EDI being evaluated in terms of NFTs?
2. Which sports have received more deals?
3. How can NFTs help support other sports, those that are less televised and visible, such as Track and field, rowing, etc.?

APPENDIX D

INTERVIEW QUESTIONS FOR NFT PROVIDERS

Introduction

May we record today's meeting? This is only for our team and will not be shared with anyone else.

Thank you for taking the time to speak with us today.
My name is [NAME], and I am a member of the student-led NFT Research Team from UCLA's Sustainability Action Research (SAR) Program. The SAR Program is a student-initiated research program that partners student research teams with a campus stakeholder to solve sustainability issues on campus. Our project this year is concerned with evaluating the environmental sustainability of NFT proposals at UCLA. We are working with Liz Kennedy, Director of Ethical Labor and Sustainability from UCLA Trademarks and Licensing to create a set of guidelines advising the UCLA campus community on the sustainability impacts of these deals.

General

1. Can you briefly describe your role at [company] and the scope of your work?
2. Can you provide a brief description of what [company] does in the NFT space?
3. Can you confirm what blockchain technology and validation method [company] uses? (ex: Ethereum and PoW, PoS... etc.)
4. What makes your platform unique in comparison to the competition out there?
5. What purchasing methods does your platform allow buyers to use? (Ex: Ethereum, Bitcoin, Other cryptocurrency, Credit/debit card...)
    a. What are the benefits of your platform's purchasing option(s), or the benefits of having such a wide variety?
    b. What are some of the drawbacks of your platform's purchasing option(s), if any?
6. Of the funds generated, what percentage of these funds go to the artist or athlete, university, and your company?

Sustainability

7. How does [company] approach the issue of sustainability with NFTs?
    a. Does your company have a formal environmental policy or code of conduct, which includes a commitment to legal compliance, continuous measurement and continuous improvements in environmental performance?
    b. Does [company] have a sustainability committee or team that addresses sustainability?
8. Have you evaluated the impact that a singular NFT transaction has with regard to energy consumption? (How did you calculate it?)
    a. If not - Do you have information on total energy consumption across a large variety of NFT products?
    b. How much of the minting process is powered by renewable energy?
    c. Polygon is a sidechain of Ethereum - are the impacts of Ethereum transactions included in your analysis of carbon or energy footprint?
9. What measures are you taking towards directly mitigating the environmental impact?
    a. Direct/indirect carbon emissions monitoring?
    b. Conducted a life cycle assessment for your product?
    c. Purchase carbon offsets?
        i. How much was offset?
        ii. What are some pros and cons of carbon offsets?
    d. Are your operations powered by renewable energy?
10. Is exclusively using renewable energy sources something that [company] has looked into? (What would the plan for that look like?)
11. What do you see as the best solution to resolving the energy consumption issue with NFTs?
12. Is a conversation being had to gauge the extent to which sustainability has come up in the NFT realm?
13. From your perspective in the industry, who is driving the conversation on sustainability in NFTs?
    a. Is it mostly from college licensing departments?
    b. Do the college athletes/subjects of NFTs themselves show an interest in the sustainability of these NFT deals?
    c. Is there pressure from within the industry?
14. What do you imagine the future of NFTs to look like (do you think they are here to stay)?

APPENDIX E

FOCUS GROUP QUESTIONS

Introductory script:

(1) Welcome

Thank you for participating in our focus group today, your responses will be very useful to our research. My name is ___ , my pronouns are ____, and I will be your moderator today. I will administer the questions, guide the discussion, and make sure the conversation is going smoothly. This focus group session is going to take about 1 hour, and you will be receiving a $50 BruinCard credit for participating. We will follow up to collect your names and UIDs, just keep in mind that the BruinCard deposits can take a few weeks to process.

(2) Overview of the topic

A little overview of the topic: We are the NFT team in Sustainability Action Research, a student-run organization researching sustainability issues at UCLA, and we are tasked with investigating the sustainability impacts of non-fungible tokens. You were selected to participate in today's focus group because currently, most collegiate NFT deals are centered around athletes. The results from today's focus group will be used in our project to understand student athlete perspectives on NFTs and NIL (Name, image, likeness) deals, and to understand student athletes' thoughts on the environmental implications of NFTs.

(3) Ground rules

Now, for some ground rules. There are no right or wrong answers, only differing points of view. We want to know your honest thoughts and opinions. We're tape recording, so please one person speaking at a time. We also wanted to note that today's focus group will be open-ended and nonjudgmental.You don't have to agree with others, but we ask that you listen respectfully as others share their views. No need to raise hands. Please avoid going on your phones during this time. We are not expecting you to know everything about NFTs, we just want to hear your thoughts and opinions on the topic. Lastly, we want to remind you that your answers will remain anonymous and that you do not have to answer any question that makes you feel uncomfortable. Thank you again for assisting us today.

(4) Introduction

Now we'll go around and introduce ourselves. Please introduce yourself by your name (first and last), pronouns, year, major, and sport.

(5) Before focus group starts, provide a definition of an NFT, and show some examples via screen share

Now before our focus group starts, we will provide a brief definition of non-fungible tokens (NFTs).

Think of NFTs as a digital trading card, or a certificate of ownership for a digital asset, like digital art pieces or short videos. NFTs are stored on a blockchain, or a decentralized ledger, which is the same technology used in cryptocurrencies like Bitcoin or Dogecoin. In the context of athletics, NFTs can include video clips of a memorable sports moment, or a digital collectible badge using an athlete's Name, Image or Likeness. We will now show some examples of athlete NFTs.
Link to DTR's NFT
Link to NFTU marketplace

Questions

1. What do you think about NFTs?
    a. What have you heard? What was good?
    b. What was not so good?
    c. Where and how did you hear about NFTs?
2. What NIL deals or sponsorships do you have (if you're comfortable with sharing)?
    a. What are your priorities with respect to deals and sponsorships?
3. Can you see any real world effects from NIL deals?
    a. What are the effects beyond financial and personal benefits?
    b. What are some other considerations you take into account with NIL deals?
4. What have you heard about NFTs for UCLA student athletes?
    a. Do you know student-athletes who have NFTs?
    b. What was good about it?
    c. Have you heard anything that was not so good?
5. What effects do you think NFT deals can have in the future?
    a. Do you believe these NFT deals will impact your or your fellow student athletes' careers or experiences?
    b. How do you think NFT deals might affect your finances?
    c. How about your popularity?
6. Have you been approached? And how would you react if approached about making an NFT deal?
7. What does sustainability look like for Athletics at UCLA?
    a. What does sustainability mean to you?
    b. Are conversations about sustainability taking place?
        i. Who is leading the conversation on sustainability within Athletics?
        ii. Coaches, Captains, Fellow Peers?
8. What does sustainability look like for NFT contracts with UCLA student athletes?
    a. What do you know about NFTs' environmental impacts?
    b. What about NFTs and carbon footprint or carbon emissions?
    c. What about NFTs and energy consumption?

9. Can you see any real world effects from NFT deals and contracts?
    a. What are the effects beyond financial/personal benefits?
    b. What are some other considerations for NFT deals?

APPENDIX F

FINAL DELIVERABLE FOR UCLA TRADEMARKS AND LICENSING

	Most Sustainable	Somewhat Sustainable	Least Sustainable
COMPANY'S CHOICE OF BLOCKCHAIN/ CONSENSUS MECHANISM	Uses solely proof-of-stake (main and/or side) blockchain(s)	Uses a Proof-of-Stake sidechain linked to a Proof-of-Work main chain (one blockchain) OR At least one chain is proof-of-stake (in a setup/arrangement with multiple blockchains)	Uses solely proof-of-work (main and/or side) blockchains
HAS THE COMPANY PERFORMED AN ENVIRONMENTAL AUDIT?	Tracks operational greenhouse emissions (energy demand of employees) and NFT minting Reasonable estimation about company's activity on any given blockchain Scope of audit includes all of company's business activities and operations Audit verified by third-party environmental audit service	Tracks emissions from energy consumption of NFT minting Reasonable estimation about company's activity on any given blockchain Scope of audit includes at least one major business partnership	Does not track greenhouse gas emissions of company

	Most Sustainable	Somewhat Sustainable	Least Sustainable
DOES THE COMPANY HAVE MEASURES IN PLACE TO MITIGATE THEIR ENVIRONMENTAL IMPACT?	Fully mitigates GHG emissions from all of the company's business activities and operations (including all NFT minting processes) GHG emissions are primarily mitigated using renewable energy, with carbon credits offsetting any remaining emissions	Mitigates at least 50% of company's business activities and operations (including all NFT minting processes) GHG emissions are mitigated using some renewable energy in its energy supply and offsetting any remaining GHG emissions with carbon credits	Does not mitigate any of the company's business activities and operations (including all NFT minting processes)
DOES THE COMPANY HAVE DEDICATED SUSTAINABILITY PERSONNEL?	Has dedicated sustainability officer(s) whose sole responsibility is to investigate and address sustainability impact	Has designated officers or employees with partial responsibility to investigate and address sustainability impact	No sustainability officer(s) or employees with responsibility to investigate and address sustainability impact
DOES THE COMPANY HAVE A FUTURE SUSTAINABILITY ROADMAP?	Has a company sustainability roadmap with actionable goals, clear deadlines measuring progress toward achieving the goals, and a clear implementation plan	Has a company sustainability roadmap with actionable goals but no set deadlines for completion or implementation plan	No company sustainability roadmap

	Most Sustainable	Somewhat Sustainable	Least Sustainable
DOES THE COMPANY ALLOW FOR NON-CRYPTOCURRENCY PAYMENTS?	Supports non-cryptocurrency payment methods (including credit cards)		Does not support non-cryptocurrency payment methods

Rationale for each criterion	
COMPANY'S CHOICE OF BLOCKCHAIN/ CONSENSUS MECHANISM	This is mentioned by both university licensing departments and NFT companies as the most important criteria to consider in NFTs. All interviewees (in university licensing and NFT companies) agreed that switching to Proof-of-Stake would be the most impactful and effective step to reduce the energy consumption of NFTs.
HAS THE COMPANY PERFORMED AN ENVIRONMENTAL AUDIT?	The rubric will evaluate whether or not companies have estimates or data for environmental impacts, including energy consumption or carbon footprint. The criteria was based on practices of NFT companies; as mentioned in the results, one company was proactive in estimating their data for NFT minting, as well as their employees' carbon footprint, while others have not collected this data.

DOES THE COMPANY HAVE MEASURES IN PLACE TO MITIGATE THEIR ENVIRONMENTAL IMPACT?	Carbon credits and renewable energy are two ways to mitigate the carbon footprint of NFTs. Securing carbon offsets is one of the next best steps companies can take after switching to a Proof-of-Stake blockchain. One has already secured offsets to cover the impact of minting, while others were unaware of or more reluctant to take this option. Evaluators should ensure that these are reputable and/or verified by a third party, as is the case for the first company. Given concerns from university licensing officials about greenwashing, we believe that using renewable energy for minting operations is more effective at directly addressing the issue of greenhouse gas emissions.
DOES THE COMPANY HAVE DEDICATED SUSTAINABILITY PERSONNEL?	Interviewees from university licensing departments mentioned that most companies were not ready to engage in discussions about sustainability or have awareness of the sustainability impacts of NFTs. Companies can demonstrate their commitment to sustainability by having a dedicated sustainability officer or at least a person with adequate knowledge.
DOES THE COMPANY HAVE A FUTURE SUSTAINABILITY ROADMAP?	One university informant recommended that university licensing departments consider an NFT company's commitment to responsible innovation, or their willingness to be a part of responsible innovation. This can be seen in a company's sustainability goals. Neither of the NFT companies interviewed had an established sustainability roadmap, although both expressed their intention or interest in developing one.
DOES THE COMPANY ALLOW FOR NON-CRYPTOCURRENCY PAYMENTS?	One university licensing official discussed looking at whether the vendor offered alternatives to cryptocurrency in the payment options for buyers. The implication is that using a credit card would avoid blockchain-related energy consumption, as compared to if the payment had been made in cryptocurrency.