

Center for the Study of  
*Social Organization*

Working on the Boundaries of the Firm:  
Uncertainty and Labor Market Intermediaries  
in an Online Platform Economy

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Working Paper #15, July 2016



**Working on the Boundaries of the Firm:  
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Economy**

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**Abstract**

The present study examines three forms of uncertainty and labor market intermediaries in an online platform economy. The findings draw on 47 in-depth interviews with creative workers who design, program, and distribute digital goods to 200 million users, in partnership with a leading entertainment publisher. These workers exist on the boundaries of the firm, earning income for their work through a revenue-sharing agreement, but with limited guidance from the firm itself. Workers note uncertainty in communication with the firm, compensation, and career trajectory. The paper identifies a new form of labor market intermediary, the *community hub*. As boundary organizations, these hubs exist between the firm and its workers, providing a space for communication among collaborators and end-users, making compensation more predictable, and illuminating a pathway from amateur to professional. The author sheds light on the nature of work and organization in the emerging markets of online platform economies.

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<sup>1</sup> The author would like to thank Janet Vertesi, Paul Starr, Joseph Blasi, Mélanie Terrasse, and the members of the Center for the Study of Social Organization at Princeton University, for their thoughtful guidance through various stages of this project.

## Introduction

The past three decades have seen considerable research on the turn away from internal labor markets (Kalleberg 2009; Barley and Kunda 2004; Pfeffer and Baron 1988). Across firms, but particularly in high-technology industries, labor markets have been externalized such that workers have high mobility, and firms wield considerable discretion, in employment decisions. Alongside this transition, the U.S. economy is undergoing a shift toward alternative work arrangements, including independent contracting, temporary help work, and work provided through contract firms. Recent figures suggest that all net employment growth in the United States between 2005 and 2015 can be attributed to the rise in alternative work arrangements, an increase of roughly 9.4 million jobs (Katz and Krueger 2016). While we now know the extent of the transformation, we still know relatively little about the experience of contingent work on the boundaries of firms.

While some scholars extoll the mutual benefits for workers and employers (Pink 2001; Reinhold 2001), others note ways in which firms retain significant control over career trajectories (Marx 2011) or how workers experience the precarity of employment outside the firm (Neff 2012; Lane 2011; Kalleberg 2009; Kalleberg, Reskin, and Hudson 2000). To challenge the claim that contingent labor markets engender so-called boundaryless careers, these latter studies emphasize the added uncertainty of employment relationships that span the boundaries of firms, relationships in which workers can neither anticipate nor assign probabilities to outcomes (Beckert 1996). One context in which we witness this broader turn toward contingency is the proliferation of Internet-mediated work through online platform economies. In these settings, independent workers participate in piecemeal production with limited worker-firm communications, unpredictable compensation, and unsure career trajectories. How do workers navigate an Internet-mediated work relationship with conditions of uncertainty?

In the current paper, I examine technical and creative workers (3D modelers, level designers, concept artists, graphic designers, animators, and computer programmers) who

collaborate and compete in an online platform economy, each eager to be paid through revenue-sharing agreements with a leading software development firm in the video game industry. Many of these workers, who identify as “contributors” or “content creators” rather than employees, begin as amateurs and use the experience to develop a professional skillset while supporting themselves financially with piecemeal production. In this case, work is frequently organized via community intermediaries, without guarantee of payment, and along the boundaries of the firm, making it a unique site in which to study the management of uncertainty in contemporary contingent labor markets.

Beyond demonstrating the persistence of constraint within an environment of flexibility, sociologists have shown the continued relevance of intermediaries in external labor markets (Bidwell and Fernandez-Mateo 2008; Barley and Kunda 2004; Kalleberg, Reynolds, and Marsden, 2003). Staffing agencies, professional associations, and Internet-based professional networking all mediate the allocation of labor (Cappelli 2008). Because they aid in pairing specific talents to firm needs, these intermediaries are commonplace within most markets for contingent labor. However, through qualitative study of a digitized and globally dispersed market for technical work, the current paper examines a setting in which this now familiar infrastructure of externalized labor markets is non-existent. Rather, when describing these settings of the “gig” or online platform economy, some suggest a technologically supported disintermediation, one in which software applications directly link workers to consumers or workers to firms (Katz and Krueger 2016; Sundararajan 2016). In this view, the platform is the sole intermediary through which firms source and manage an external workforce. Although many observers and participants stress the independent, allocative function of these novel labor markets, this study points toward the overlooked social structures that continue to organize work in online platform economies.

Further, alternative work arrangements are now widely dispersed across and within occupational categories, yet we know little about how workers experience their career trajectories within these novel arrangements. Pioneering research on contingent labor markets emphasized the

precarity of work for low-skilled workers (Kalleberg and Sørensen 1979), while later studies filled the gap with examinations of high-skilled contingent work (Barley and Kunda 2004). We now have a convincing description of labor market processes for these broad categories of workers, but little research exists on the transition between worker categories within contingent labor markets. What does the professionalization process look like for workers outside firms and without the support of professional associations or traditional labor market intermediaries? The present study targets a diverse sample, including high-skilled technical workers, many of whom have spent time as employees of industry-leading firms, as well as their semi-skilled and hobbyist counterparts training to make the transition from amateur to professional. The focal industry is notoriously one of uncertain professional trajectory, where credential markers of expertise, sources of job-skills training, and career security are lacking. As will be shown, the present context acts as a kind of technical proving ground in which hopeful hobbyists can expand their portfolio, observe, mimic, and transform professional practice, and make a name for themselves among an increasingly crowded field.

Regardless of the net benefit for firms and workers, it is well established that individuals and teams working alongside the boundaries of firms experience added uncertainty as a result (De Witte 1999; Sennett 1998). This paper explores the strategies, tools, and structures with which independent producers manage three sources of uncertainty in the market for their goods and labor: limited interaction with the focal firm, unpredictable compensation, and unsure career trajectory. In particular, the *community hub* is identified as a new kind of labor market intermediary, a type of boundary organization that structures work and serves a professionalization function alongside online platform economies.

After reviewing the literature on contingent work, labor market intermediaries, and professional practice, I describe the unique setting of this research, as well as the qualitative methodology used to collect data on workers' experiences. I then present findings on the relationship between workers and firm, the resulting uncertainties of contingent work in this

setting, and the community hubs that organize work on the boundaries of the firm. Finally, I offer insight as to the implications of this novel case for alternative work arrangements more broadly.

## **Literature Review**

### *The Experience of Contingent Work*

Considerable research exists on the trend toward contingent work that began in the 1980s and reached a fever pitch in the 1990s, when employment statistics began to show an uncharacteristic decline in adult male job tenure (Kalleberg 2009; Barley and Kunda 2004; Pfeffer and Baron 1988). This transformation is widely framed as one from traditional, employment-based labor relations, with the job security, health, and pension benefits of a long-term employment contract and internal career ladder, to one more closely resembling the market ideal of impersonal transaction, where employer and employee loyalty are eschewed in favor of self-reliance. Competing positions stress relative gains for workers, in the form of increased spatial and occupational mobility (Bridges 1994; Jurik 1998; Pink 2001), or for firms, as they can practice more dynamic hiring strategies (Cappelli and Neumark 2003; Connelly and Gallagher 2004).

In their study of contingent work, Barley and Kunda (2004) present a favorable and widely shared view of alternative work arrangements. Frustrated by the constraints of traditional employment, high-tech contractors tap networks and employment agencies to land temporary positions. Importantly, these high-skilled workers opt for contingent work on a voluntary basis, as credentialed professionals with multiple employment opportunities from which to choose. While enjoying the freedoms of a flexible schedule, generous compensation, and self-reliance, these workers experience the difficulties of finding their next job, managing employer expectations, maintaining their skillset, and negotiating with employment agencies, to say nothing of their limited benefits like health insurance and pension plans. The authors note, “By demanding the independence of a capitalist, contractors also incurred its risks” (2004:289). While the risks of

finding itinerant employment and adapting to firm-specific needs present challenges, these workers ultimately embrace contingency as liberating.

The benefits for these workers notwithstanding, the experiences and outcomes of contingency are hard to predict. Where a corporate culture places special emphasis on the contributions of permanent staff, contingent workers may experience the limits of being an outsider (Kunda 2006), such that workers disengage and performance suffers. Alternatively, many firms see strong engagement from temporary workers, some of whom may rarely work on-site or interact with core staff. Contrary to exchange theory, which would predict lower organizational commitment among contingent workers, Van Dyne and Ang (1998) identify strong affective connection of contingent workers to firms, such that organizational citizenship of these workers can be higher than that of permanent employees. This is especially true for white-collar professionals, where identifications with a professional practice seem to trump status differentials between core and peripheral staff (Van Dyne and Ang 1998). Contingent workers may also be motivated by possibilities for on-the-job skill development (Marler, Barringer, and Milkovich 2002) or upward career mobility via temporary positions (Hardy and Walker 2003). Because contingent work differs greatly across industries and occupations, the factors affecting work experience are numerous and variable from setting to setting.

One subset of contingent work is organized around online platform economies. The work experience of this recent phenomenon has seen limited study, yet popular attention is directed toward services like Uber, TaskRabbit, and Amazon's Mechanical Turk, foundations of the so-called "sharing" economy (Schor and Attwood-Charles 2015; Sundararajan 2016). Much of the existing research is limited to questions of user experience or consumer-market impact (Bardhi and Eckhardt 2012; Zervas, Proserpio, and Byers 2016). In one of the only labor market estimates, Katz and Krueger (2016) approximate that 0.50 percent of the U.S. working population earns money through an online platform economy, a figure that is growing rapidly (Farrell and Greig 2016). A skeptical view of work on these platforms comes from Scholz (2013) and

colleagues who consider the costs of paid and unpaid work online. With new modes of productivity on social media networks and online platforms, we see an expansion of value extraction as firms recognize the revenue possibilities of treating consumers as producers (Terranova 2013). We can also see the attractiveness of these new modes for workers. For instance, De Kosnik (2013) shows how members of fan communities on YouTube, Facebook, and Twitter are uncompensated revenue generators, many of whom treat their creative efforts as a first step toward a professional career in a creative industry. Like the traditional internship, crowd-sourced content creation offers the possibility to gain creative work experience in lieu of compensation.

In the present case, rather than bringing contingent workers into the firm and onto project teams, the production process happens alongside the firm via an online platform. As in freelance work, this means that workers complete projects alone or as part of a collaborative partnership and then submit finished or nearly finished products to the firm for distribution. While a few permanent partnerships do exist, the overwhelming majority of collaborations happen in temporary project teams, an arrangement similar to the organization of technological and creative work inside firms. A body of sociological research investigates the dynamics of temporary creative teams (de Vaan, Vedres, and Stark 2015; Bechky 2006). De Vaan, Vedres, and Stark (2015) show that innovation is best achieved with a mix of familiar and unfamiliar connections in a project team, such that cognitive and social distances are optimized in productive tension. In this account, uncertainty within teams, or cognitive distance, yields the most innovative results. Beyond network properties of creative teams, Bechky (2006) challenges the common notion that temporary organizations lack structure. Although they may not exhibit the role boundaries of hierarchical coordination or longstanding interpersonal relationships that we find in firms, these teams rely upon structured role systems that are developed in situ, through the enactment of generalized roles.

What gets left out of Bechky's (2006) otherwise thorough analysis is the institutional structure acting as foundation upon which role-based coordination is enacted. For her, each temporary project can be seen as a "temporary total institution," but we hear relatively little about the training or professional standard setting that underlies the system of generalized roles. Like the film industry, the video game industry relies on strong institutionalization of the role structure. This process is undergoing transformation as production moves beyond the boundaries of firms and into the homes of content creators. In such a contingent labor market, it remains to be shown how and if temporary teams come to organize along the lines of the professionalized role structure. To better understand this process, the present study explores intermediaries that organize contingent, team-based work online.

#### *Intermediary Organizations in Contingent Labor Markets*

In foundational studies of contingent labor, research highlights the relationship between workers and firms in isolation, without attention paid to the institutional structure underlying external labor markets. Barley and Kunda (2004) add nuance to this characterization, emphasizing the structures that make alternative work arrangements viable for firms and workers alike. Of particular interest to Barley and Kunda (2004) are the intermediary organizations, such as employment agencies and professional societies, that set the stage upon which the contingent labor market functions. Likewise, Benner (2003) examines intermediaries in Silicon Valley's high-technology labor market. He develops a threefold typology, including private sector, membership-based, and public intermediaries. Each of these types includes organizations that are increasingly familiar to us, with private sector intermediaries, such as temporary help firms, contract brokerage firms, and Internet-based job boards, predominating alongside public intermediaries like job training and non-profit placement agencies. Membership-based intermediaries have waning influence today, but include professional associations and guilds that facilitate job placement as a benefit of membership (Benner 2003). How do these intermediaries change the traditional work arrangement between employee and firm?

Bidwell and Fernandez-Mateo (2008) help us understand the resulting *triadic* employment relationships with regard to compensation, task assignment, and job security, but urge additional research on work arrangements as a “system of ties” around intermediaries. In the context of online platform work, it is possible that these intermediaries affect other dimensions of high-skilled contingent work, including training and task completion via collaboration. To this end, it’s worth considering how the intermediary function has evolved over the past decade.

Barley and Kunda (2004) remark on the novelty of their research setting, claiming that the market for technical expertise in Silicon Valley was a “sprawling, emergent, loosely coupled, and at least partly virtual social system” (2004:26). If this was true at the time, the expansion of Internet-mediated work has only intensified these properties of contingent labor markets. In the present case, individuals create digital goods for a firm from the comfort of their own homes, located anywhere in the world. Yet, the intermediaries that provide structure in the aforementioned research sites are conspicuously absent in the present context of an online platform economy.

In place of hiring agencies and professional societies are online communities, collaboration networks, and digital submission portals for finished work. These structures correspond with new work possibilities inside and outside of the firm. For instance, Hwang, Sing, and Argote (2015) study the use of online knowledge networks within firms, showing that, as experience with the community grows, expertise-based boundaries strengthen alongside the relative weakening of categorical boundaries (such as those of role status and geographic location). A skill-based hierarchy is said to structure these knowledge-sharing communities within firms, but we can also examine how this structure plays out beyond the firm, where hopeful workers interact with online communities. As Internet-mediated production becomes increasingly common for workers of many industries and skills, it is worth considering the role of these organizations in structuring work along the boundaries of firms. Of particular interest is the process by which workers adopt professional practice.

*Professional Practice in Alternative Work Arrangements*

The growing trend toward contingent work received scholarly attention alongside similar focus on the changing nature of professional work and training more broadly. In their review of literature on the professions, Leicht and Fennell note that professional career trajectories are “increasingly conditioned by opportunities within organizations, and the organizations within which professional work is done are themselves undergoing dramatic changes in both control structures and accountability” (1997:216). Indeed, when Leicht and Fennell (1997) wrote their review, a shift in the relationship between professions and organizations was in full swing. The largest shift came as resource-strapped external actors, such as firms and the state, constrained the autonomy of professional practice. The bulk of attention focused on the role of professionals within firms, as in Tolbert and Stern’s (1991) study of professional compensation in corporate law firms. At the time, the increasing mobility of white-collar workers was identified as a puzzle worth exploring.

In some industries, the inculcation of professional practice that once affected white-collar workers within firms is transforming alongside the shift to contingent employment. In these environments, how do practitioners make the transition from amateur to professional? Traditionally, this process relied on a split between elites and practitioners. Friedson (1994) writes on the stratification between elites and practitioners in the professions, where elites are typically responsible for training, but most status rewards accrue to practitioners given the relative visibility of their work. According to Leicht and Fennell (1997), the patterns of stratification between elite and practitioner will likely undergo transformation as the settings of professional work are likewise transformed. In examining a new employment relationship, the present setting revives earlier debates among sociologists and practitioners over the boundaries between amateur and professional, as well as elite and practitioner, in the workplace.

It is increasingly common for so-called “flexible firms” to use transactional contracting of outside professionals alongside traditional, long-term contracts for core employees (Kalleberg

2001; Davis-Blake, Broschak, and George 2003). Adopting this model, the video game industry sees professionals within the firm (and, increasingly, within many high-status development studios) take a curatorial and management role of outside professionals. Some of these outside professionals work in “white label” or “ghost development” studios, concealed sub-contractors that do the bulk of digital content creation on a project, but without the status rewards of publishing a product that is commercially well received, critically acclaimed, or both. Others, like the workers studied in this paper, produce professional-quality work via an online platform (through reliance on an industry-standard work process), but fall on a wide-ranging spectrum from hobbyist to industry veteran. As such, the present case provides an opportunity to study professional career trajectories within a setting of dispersed work online, one that lacks the socialization and training of firms, professional associations, and credentialing institutions.

These professional workers must develop skills to match firm expectations. While some professions, such as medicine and law, witness increasing employment concentration within firms, scholars of the professions point to a simultaneous shift in the opposite direction, with some high-skilled, white-collar work moving out of the firm. Looking at the impacts of the shift toward precarious work, Kalleberg writes, “Opportunities to obtain and maintain one’s job skills to keep up with changing job requirements are also precarious. Many workers are hard pressed to identify ways of remaining employable in a fast-changing economic environment in which skills become rapidly obsolete” (2009:10). The result is that workers are more likely to return to school after an employment stint, breaking up the conventional trajectory of professional careers. While professional schools play a crucial role in many industries, some industries exhibit less dependence on formal education and instead value on-the-job training or self-taught expertise. In studying this revised trajectory, some emphasis has been placed on organizations that serve the role of intermediaries, yet break from the traditional role of professional associations and institutions of higher education. For instance, Hellmann and Puri (2002) suggest that the role of venture capital firms extends beyond mere financial intermediation to the process of professional

training within young start-up firms. These intermediaries are essential in developing work practice and facilitating communication across boundaries (Kellogg 2014; Long Lingo and O'Mahony 2010; O'Mahony and Bechky 2008), yet we know little about how they operate or what form they may take in the context of online work. In examining the relationship between workers and intermediaries that guide professional training outside of the firm, the present study sheds light on an alternative form of professionalization in the new economy.

## **Data and Methods**

### *The Setting*

The novelty of the present setting requires extra attention to the space of user-generated content itself. Yet, before we can address the novel properties of this space, it's instructive to draw a comparison with a more familiar organization of work. The work setting in the present case is closest in form to small-scale production in a workshop. When individuals think of a workshop, they might imagine the picture of a skilled craftsman's artisanal shop, with tools strewn about, assistants shuffling around, and goods waiting to be brought to market. Perhaps the artisan has a showroom attached to the shop, a display space wherein he or she can set the parameters of sale. Or, it could be that the craftsman functions as a supplier through a contract with a larger firm. If not, individuals or workshop teams may bring goods to a marketplace and set up a stall in hopes of reaching potential buyers directly. The craftsman might train an apprentice who will one day create his or her own workshop. In sum, the craftsman works independently or in a small team outside the boundaries of a firm, producing small-batch goods through a high-skilled work process.

The present setting shares many functional similarities with this workshop caricature, but exists in dispersed fashion, via the Internet, on the personal-computing devices of digital artists and programmers. The individuals interviewed for this study produce and market goods alone or in teams using specialized software tools. They vary in skill level and experience, ranging from the freshest amateurs to industry veterans. There are five women and 42 males in the sample and

all participants are between 18 and 40 years old, with roughly half possessing some relevant, college-level skills training. In collaboration, they send written and diagnostic feedback, as well as digital components, to one another via the Internet. When they finish a product, they upload it to a digital submission portal and distribute it by means of an online platform economy, in partnership with a large entertainment publisher. This publisher (hereafter “the firm”) controls the content pipeline, as it sets parameters for creation and curates the distribution of digital goods to consumers.

The online economy is one component of the firm’s multi-media platform, a 200-million-user software suite that distributes digital content (video games, supplementary goods and services for video games, specialized development tools, films, live broadcasts, and written material) and functions as a social network for its users. In particular, the workers studied here focus on supplementary goods for video games, known in the industry as *assets*. Some assets are offered for free, whereas others require purchase with national currency pre-deposited in a platform-specific account.<sup>2</sup> In this paper, I discuss workers in three of the firm’s most prominent marketplaces, each pertaining to a different video game. As of this writing, these marketplaces, which emerged within the past five years, are visible to some 11 million people at any given time, include about 180,000 free or paid assets, and generate upwards of \$50 million in revenue for content creators.<sup>3</sup>

If unfamiliar with this type of market, you might wonder what goods people are buying and how these goods are made. Imagine that you open a market webpage in your browser, where you see goods listed with prices and quantities available. Perusing the marketplace, you see a purple pirate’s hat and you decide to buy it for one of your avatars in a video game. This type of

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<sup>2</sup> It is worth noting that several secondary markets exist for the goods described in this paper. Third parties find ways to circumvent the platform-specific trading and currency restrictions, thus making it possible to buy and sell without the firm’s authorization. These transactions do not have a direct effect on the work studied here.

<sup>3</sup> Anyone can view the total number of unique submissions, but the firm does not release the number of unique contributors. The number of submissions per person within the present worker sample ranges considerably and varies by market, from a handful to several hundred assets per worker.

asset, known as a *cosmetic*, is made using the skills of *concept design*, to sketch the basic idea of the object in two dimensions, *3D modeling*, to create the digital object and give it the structural properties of a pirate's hat, and *texture design*, to apply the shade of purple and other visual accents.<sup>4</sup> Similarly, we could see a new video game environment, known as a *map*, created using the skills of *level design*, to organize the layout and facilitate good gameplay, and *environmental art*, to beautify the map with graphical textures. Like the hat, this map acts as an addition to an existing game, available for free or for several dollars via direct download to anyone who purchased the corresponding standalone game. Lastly, when they produce new goods, content creators must cater to the preferences of potential buyers and the production standards of the firm acting as curator. If successful, workers are compensated via sales revenue that they share with collaborators, third-party service providers, and the firm. For the full-time, yet contingent workers interviewed here, this revenue constitutes their sole source of income, sometimes totaling more than \$100,000 a year for the most successful among them.

The user modification of video games described in this brief introduction is a decades-old phenomenon, yet the turn toward monetization is much more recent, enabled, in part, by the online platform economy examined here (see **Figure 1** below). For our purposes, the lineage of user-generated content can be traced to the late 1990s, when modification (or “modding”) of video games was democratized by the software distribution capabilities of the Internet.<sup>5</sup> Avid fans increasingly became amateur developers as design software and software-development kits (SDKs) made their rounds on the Internet. In fact, many of the individuals I interviewed started

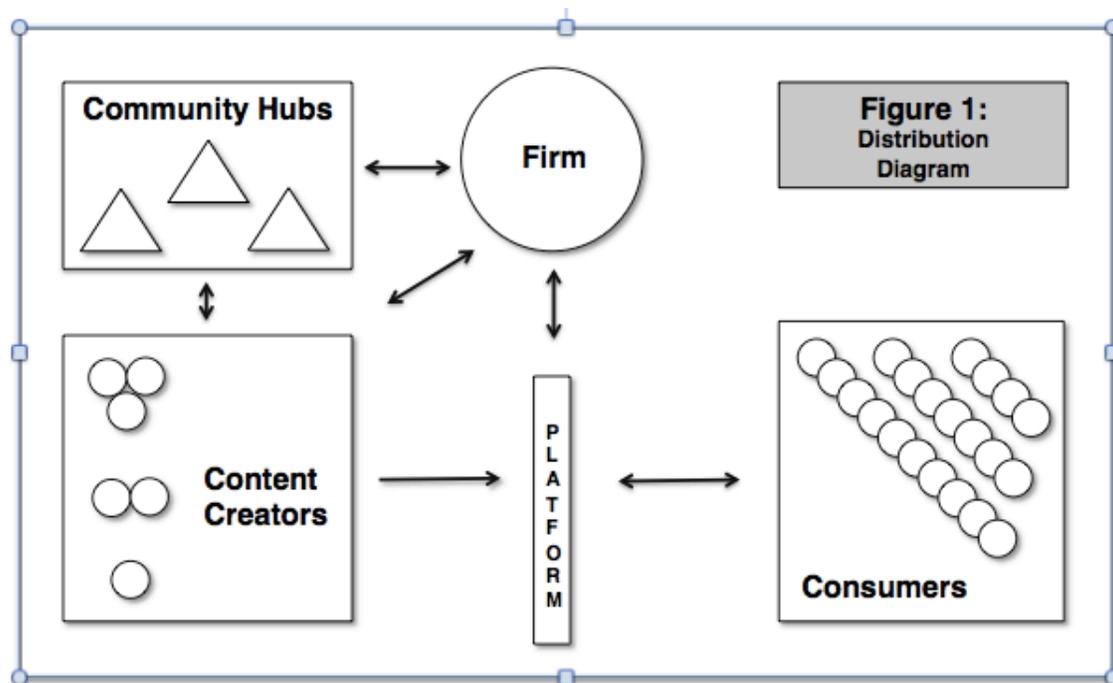
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<sup>4</sup> Owing to conditions of distribution that will not be described here, this hat could be worth \$400 or several cents. The market prices of the assets are wholly unrelated to conditions of production.

<sup>5</sup> Despite the initial success of these efforts, the openness to user modification that characterized some video game publishing was not the norm during the rapid growth of the past two decades. As with most software distribution, the majority of video games are walled gardens, that is, closed systems that may offer the illusion of wide-ranging choice, but nonetheless restrict the average user from accessing many aspects of the product (Turow 2005; Gillespie 2007). Enterprising users can modify even the most restrictive pieces of software, but they will not benefit from the support of the publisher and may even incur risk of legal action should their tampering become public knowledge. The predominating reluctance to distribute games as open systems is now transforming toward increased user contribution, from early-stage feedback on releases to user-friendly modification tools and open-source or inexpensive game-engine licensing.

learning their craft at this time, cultivating lay expertise with the freely available tools of professional game development.

Unlike many professionals in other industries, video game developers often start honing expertise as a hobby, frequently through trial-and-error using unlicensed copies of modeling and design software. The proliferation (whether by legal or illegal means) of user-friendly software and open-source development tools provided would-be experts with the resources necessary to experiment in their favorite worlds. If they were following the traditional employment pathway of the industry, these hobbyist developers would either begin design or programming instruction in higher education or apply to a development studio on the basis of a design portfolio. The most recent phase of industry growth owes, in part, to a broad shift in game distribution, wherein publishers eschew top-down control to tap the creativity, commitment, and technical skill of fan communities in modifying their products. I drew the present sample from three such communities, members of which are compensated for their efforts while working on the boundaries of a focal firm. However, it is important to note that production of assets continues, in parallel, within the firm by full-time, on-site employees. I do not study these professionals directly in this paper, yet they serve crucial standard setting and gatekeeping functions from within the boundaries of the firm.



### *Methodology*

The analysis presented in this paper is based on data collected through fifty in-depth interviews with participants across three continents and eight countries. Nearly all of the interviews were conducted via voice over IP (VoIP) chats that lasted for an average of one hour and fifteen minutes each. Each interview was recorded and made anonymous with the consent of the participants.<sup>6</sup> Several individuals who were uncomfortable with voice chat were invited to respond with a text-based questionnaire. As a widely-used online meeting tool, the VoIP chat software was not only familiar to the participants from their own collaborative work, but also aided the interview process by providing a space for visual props and the collection of documentation. Interviewees would often present me with images of work-in-progress, promotional material for their submissions, or behind-the-scenes paperwork from their dealings with collaborators and employers. I drew on the contents of this material alongside participant responses. Mimicking a common collaborative technique, a few even shared their screens during our conversation, allowing me a direct window into their work process.

<sup>6</sup> All identifying information was anonymized and participants were given pseudonyms prior to analysis.

The semi-structured interviews began with a description of an individual's introduction to digital goods creation, traced his or her career trajectory, and then varied depending on the current roles of each worker. Each of these content creators has a variety of unique skillsets that often overlap in practice and shift across projects. They are concept artists, 3D modelers, texture artists, programmers, environment artists, level designers, animators, and filmmakers. While most are high-skilled content creators (or practicing to improve their skills), many lack formal training and did not experience the school-based professionalization common in other technology industries. The primary inclusion criterion for the sample was content creation for one of three markets.<sup>7</sup> Individuals were sampled from each of the three primary markets using either random sampling of submissions or snowball sampling via participant networks. Random sampling of submissions required regular attention to the digital storefront. To initialize a snowball path, I would choose two of the top sixteen contributors per day to solicit for an interview. As new submissions were added to the system each day, sorting algorithms repopulated this list and provided a fresh set of potential participants. Although the submissions of novice and long-time contributors co-exist on the storefront, popular contributors are structurally advantaged when promoting new submissions, thus leading me to oversample workers with a network of followers.<sup>8</sup>

Once a path was initialized, I sampled on the basis of referrals, following a network path until no new leads were available. Most of my contacts were established through this process of referral, so it's worth understanding a bit more about how this process unfolded. In this case, the process of networking for interviews owes much to the structure of the software platform used by workers, consumers, and the firm. As a registered user of the platform, I was able to maintain an

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<sup>7</sup> A handful of interviews were conducted with community service-providers and studio developers uninvolved with production in these markets.

<sup>8</sup> Popular contributors gather more followers to their immediate network. When they release new creations for the community, the platform automatically displays their goods to this core network of followers, notifying them of a new asset release. When followers view and rate a creator's latest submission, the good is filtered toward the front of the digital storefront. In this way, networked creators (i.e. those with followers) are more likely to get exposure to the general population of users.

ever-expanding list of contacts. When I attempted to establish contact on the basis of a referral, the referred party could observe my list of contacts as a network-based judge of credibility or familiarity. The participation of any existing contacts remains confidential and anonymous, but the next participant in the chain is able to exercise a quick vetting to see that I am indeed embedded in a network of fellow contributors. This has the potential to be exclusionary as well, particularly when unidentified tension between potential participants makes some network nodes negative rather than positive signals. Still, a few participants remarked that the visible network allowed an outsider like myself to penetrate the walls of some less accessible groups of workers. This access, along with the random sampling of submissions, worked to create a balanced image of these communities.

I complemented the contributor interviews with purposive sampling of experts and industry professionals. These experts managed so-called service-provider websites that functioned as community hubs for prospective and veteran work shoppers alike. As I learned of the centrality of these communities to the organization of work, I began to conduct interviews with their leadership. Each of these individuals has been involved with user-generated content (UGC) communities for over a decade, so they were able to provide contextual information regarding the evolution of their respective communities and the industry as a whole. To understand the industry perspective of this contributory work, several interviews were conducted with on-site employees of game development studios. In the following section, I report the findings of the study, first noting three points of uncertainty, elaborating on the work experience as it relates to this uncertainty, and ending with the role of community hubs as intermediaries that organize work in this labor market.

## **Findings**

As seen in the literature on contingent labor markets and professionalization, workers outside the firm face sources of uncertainty regarding employment and career prospects. The workers in this study are no different, as they variously lament and benefit from uncertainty in

their work. While I did not ask about it directly, the theme of uncertainty figured prominently in all of the interviews with contributors, with three sources receiving the bulk of attention: limited communication with the firm, unpredictable compensation, and unsure career trajectory. As we will see, not all of the workers are exposed to these sources in equal measure. In this online platform economy, navigating the boundaries of the firm means finding ways to manage uncertainty in the context of one's own skillset and ambitions.

Below are three representative vignettes, each with successful, full-time workshop artists who vary in their career goals and past work experiences. Susan, a concept and texture artist, holds a Bachelor's degree in video game art and design. She has worked on-site with leading development companies, but now earns her living through work on the platform. She captures the frustration of many who try to establish a direct relationship with the firm.

“I think it's just the kind of stress of the uncertainty of whether or not we are going to be making money and if we do get something in, is it going to be something that's going to be a big windfall or is it something that's going to be cannibalized by something else that we didn't get into. Not being able to communicate with [the firm] over things that at a normal job would be simple. It's just, there's a lot mentally... it is kind of a stressful job. I love doing it, but like I go through this thing like every few months, like ‘forget this, I need to get a real job again, I can't handle this, I just can't!’” – Susan

Without the firm's input, are we to assume that Susan operates in isolation via the platform? In the absence of contact between worker and firm, we will investigate the role of worker-to-worker learning and user-to-worker feedback. In addition, we can see that Susan is nostalgic for the predictability of her past job in a development studio, yet continues working on the platform because it offers the vague possibility for windfall profits. On this point, Taylor, a self-taught texture artist who supports his family through work on the platform, highlights the unpredictability of compensation in this labor market.

“It brings about stress in a very bizarre way . . . I'm pretty much a neurotic mess – because you are kind of playing a lottery. It's an interesting thing every time. I guess you could say, because I have several things in a year, I am, to some degree, established – that I have a pretty good chance of getting something in later. You'd think that it would comfort me somehow. Not at all, I assure you. Every time, I'm thinking, ‘Are they gonna pick me or am I going to the poorhouse?’ No... But it's the difference between making a giant chunk of money and not, and there's no in-between. I have no forewarning. I don't talk to [the firm]. I have no idea what they're looking for. My best hope is that I made some stuff that I think is cool and they agree.” – Taylor

Each distribution cycle introduces a new period of tension, as contributors await selection of their work (“getting something in”) and anticipate the best strategy for steady income. Like many contributors, Taylor invokes the concept of lottery as a metaphor for a context in which he perceives limited agency in earnings. We will see how Taylor and others collaborate to develop strategies that smooth compensation. Lastly, Stephen, a self-taught 3D modeler whose work supports about half of a dual-earner household, echoes frustrations over limited communication. Importantly, he emphasizes his career motivations for working on the platform.

“When it comes to trying to get in contact with [the firm], it’s usually one of those ‘shouting in the wind’ situations, and it’s quite infuriating when you need feedback or are trying to give feedback on tools and systems related to [user-generated content] . . . My goal is to use [user-generated content] as a way to practice and fund my training to become an actual 3D artist in a game development studio. Right now, the main barrier is just getting content approved and still being motivated, in order to actually get the funding needed for the formal art training I believe I need to work in a studio . . . Currently this is my primary occupation, though its viability for the future is questionable, so I’m always looking for new things to do.” – Stephen

Although he does not yet consider himself an “actual 3D artist,” Stephen uses the work experience as practice for a future position, while also saving for the formal training that he believes is required for on-site employment. In the discussion of career trajectory, we will explore the ambiguous transition from amateur to professional, focusing on workers like Jonathan who rely on the collective resources of *community hubs*. In fact, each source of uncertainty is confronted using the resources of community hubs, social devices (Beckert 1996) that limit choices and introduce some predictability to contributory work. These organizations have received limited attention in discussions of work in online platform economies, yet play a central role in the working lives of these contributors. In the first section, we will begin by exploring communication with the firm, the circumstances surrounding compensation, and the stages of expertise from beginner to intermediate and professional. In the second section, we will investigate the role played by community hubs acting as labor market intermediaries.

## *1. Navigating Uncertainties in Communication, Compensation, and Career*

### *Limited Interaction Between Firm and Contributor*

The content creators put great thought into their standing with the firm, in part because they are frustrated by the nature of this relationship. While all workers report regular interaction with peers and end-users, only a few could point to two-way, business-related communication with the firm (aside from the automated responses related to earnings or submissions). In fact, when asked to characterize the nature of his or her business relationship with the firm, every participant remarked that a relationship was either nonexistent or severely lacking in communication. This is especially true for very successful creators who have adopted a blasé attitude toward their pseudo-employer. In one interview exchange, a prolific and self-taught content creator named Jim had this to say when asked about his business relationship:

Jim: I don't think I have a business relationship with [the firm]. You can't even consider yourself a hired worker, like a contract worker, because they can reach out to you and you can do stuff for them, but you never should expect anything from them. Because if you start thinking that this is a working relationship, where you are, like, a contractor or something like that, you're getting it wrong. Because there's a lot of people and if [the firm] wants someone... and you think that you have some value? You do not. They can get someone else [ . . . ] I know some people who think that [the firm] kind of has to give them something, but in fact they do not because you want something from [the firm], not the other way around. [Laughter]

Interviewer: True. Then again, they also benefit from having your work, the good work that you do.

Jim: The amount of the work on the [platform] is so much that they can pick from everyone and they get a cut from all the market transactions after it. So if they do not want you they can cut you out at any moment. So it's better for you to think like that. Never think you're employed or you're a contractor, because if they want you to be a contractor you can get hired as an outsource worker.

This transcript excerpt is representative of boundary experiences of these workers in two ways. First, participants readily acknowledge the categories of on-site employee, contract worker, and contributor. The first two categories are familiar to us, as traditional and alternative work arrangements that have received much scholarly attention. Content creators believe that their work falls into the third category of contributor, where the employment commitments between firm and worker are nearly non-existent. However, while they acknowledge the limits of their tenuous employment relationship, they expect some commitment in the form of compensation

and work-related feedback from the firm. For instance, if the firm selects their work, creators expect prompt payment according to the terms of their revenue-sharing agreement. They also look to the firm for simple commentary regarding their submissions, communication about future plans for a product line, or, in the very least, prompt acceptance or rejection of their assets. Put differently, while individuals appreciate the independence of contributory work, they seek guidance in what to work on and how to work on it so that they may be successful.

Relatedly, Jim conveys a sense of inconsequentiality that is often shared by his fellow contributors. While proud of their contributions, workers often downplay the relative significance of any one good that they produce. The ratio of firm selection to contributions is such that creators come to minimize their expectations of success, regardless of the quality of their work. When they are successful, they attribute their success to good fortune rather than individual talent or workmanship. They do not receive any reinforcement, whether positive or negative, from the firm acting in its curatorial role. Not particularly satisfied with their piecemeal and unpredictable work arrangement, most view market participation as a stepping-stone toward greater impact along the lines of traditional employment in a firm, a fact that we will explore in more detail later.

On the first expectation of firm commitment, successful contributors are often pleased to learn that they are promptly paid if the firm accepts their work. The online platform facilitates fluid payment from the firm to contributors, and a support staff is available to field inquiries regarding pay. As we will see, this does not mean that compensation is predictable. The second expectation, which is communication with the firm regarding contributions, is rarely met. The firm does not make a habit of communicating directly with the content creators or fielding work-related questions. Below, three other contributors who share Jim's sentiment describe the nature of communication with the firm:

“[The firm] selects what they want to consider and it's entirely up to them. We get no feedback in the process. Sometimes we don't even hear anything until it gets in the game. So it's kind of like a free-for-all. You feel like you just don't know. You just have to cross your fingers and hope that they like it, and sometimes they ask for some minor changes, like minor feedback, but that's usually all we hear from them.” – Susan

“Ok well actually, it’s very difficult to get in contact with [the firm] and interestingly, I didn’t know that they were looking at the designs that I had picked for the game until the update was actually launched and it was in the game already.” – Mark

“Most of my relationship with them is sending me an automated email telling me that my [asset] got accepted and then automated payments to my bank account. There’s a few times that I’ll email them, there’s a very specific person that everyone will email with like [asset] troubles . . . The only thing he’ll say is ‘we’ll have this fixed in the next update, thanks.’” – Jason

Because of the potential transaction costs associated with a widely distributed supplier network, the firm has tried to streamline production-related communication via the platform. Work teams have an official communication page that functions like a message board, allowing two-way communication between the firm and work team regarding a given asset. Stephen, a 3D modeler with formal training in game design, describes the process, saying “After submitting the project for review, the game developer can ask for changes, and then re-review it after the changes are made by the artists who submitted the project. However, after that, it’s completely out of my hands whether it is going to get released, how the release is going to be handled and if any extra development is necessary. After the project is in game, there is not much I can do to change anything.” According to Stephen and others, the firm uses this functionality to a limited extent, preferring instead to choose assets that are “ready-to-ship” rather than dedicating firm resources to a protracted and uncertain revision process. One contributor, with over five hundred projects completed, reported that only ten percent of these projects received any feedback from the firm. Instead, the bulk of firm-facing attention happens through automated interaction with the submission portal. In the vast majority of cases, finished work is uploaded by workers, selected internally by the firm without comment, and distributed to consumers via the online platform.

Given the firm’s stance of limited communication, workers rely on peer contributors and end-users for feedback. Although I took the individual as the relevant sampling unit, the workers that I interviewed were likely to work in teams. This is because most asset production requires a range of skills, and while some generalists have strong proficiency in each, most workers

specialize in doing one thing well. In this way, they mimic the division of labor found within firms. These teams are not organized by the firm, but assemble from within the community of contributors. Jacob recalls his initial foray into the community, explaining, “There’s just a network of 3D artists. There’s a network of animators. There’s a network of 2D artists, like myself, and we all just get together and collaborate . . . Somebody in my [studio] happened to run a forum called [HUB1], which was just a community of creators basically and that’s where I kind of met my first reliable person, you know? And we just started working together all the time. I was working with a bunch of different people.” This teamwork may be thought of as an inner circle of production, one that is embedded within a larger feedback network.

Ryan is an industry professional who contributes work on the platform alongside an on-site job at a development studio. Like Jacob, he relies on networks of collaborators in addition to a wider support group. He describes a pattern of circulation that happens in this wider network of peer contributors, saying, “I still rely on that kind of stuff. Not necessarily to promote my work or meet people, but just to learn. And because the industry is so small that you know, within a few years you end up knowing a ton of people and then you share some of your work and they share your work and all of a sudden it’s all over the place.” The process that Ryan describes is one in which fellow workers offer comments and critiques on assets and general guidance as contributors develop their skills and produce new work. Through this feedback, he learns which assets are worth pursuing, how he might approach the design process, and who could serve as a future collaborator.

In addition to peers in the contributor communities, workers interact directly with end-users as fellow consumers. Workers variously identify as contributors, players, or some combination of the two, but nearly all are avid fans and users of the games for which they create. This means that they have an on-going opportunity to interact with the end-users of their creations. Timothy represents the feelings of contributors when it comes to end-user interaction, saying “I’d still like to play it enough to stay involved, like I still want to take part in the

communities and all that . . . I hop in [the game] when I can and take part just to know what the community is up to as far as the player base goes . . . I use it as a way to gauge what I should work on as well, like if they're looking for a certain kind of thing then I could go work on it.”

Sometimes the solicitation of feedback is more direct. Recalling his recent promotional post on an end-user message board, Richard, a self-taught contributor remarks, “I reply to basically every comment. This one had, overall it has 313 comments on it and I replied to, I think, everything. I try to do it within five or ten minutes [of the comment], just to keep on top of it really.” This approach is typical of newcomers who seek support among the player base. On the basis of end-user interactions, contributors might consider a few changes to existing creations or be inspired to make a new design, but will rely most heavily on fellow workers for actionable feedback. For Timothy, Richard, and their peers, the contributor community is merely one dimension of a larger player base that can help decide what to work on and how to execute projects in the absence of firm guidance. At the same time, these interactions are crucial supplements that allow contributors to find meaning in work that goes largely unaddressed by the firm. Brian captures this succinctly when he tells me, “I love being able to talk to people who either wear my designs or like my work in general. It gives the work you poured into a design meaning when someone else responds to it positively or critically.”

### *Managing Unpredictable Compensation*

“I have the best job in the world. No one knows who I am. I don't have to go to work. Nothing. Nothing! My pay gets deposited directly to my bank account. I don't have a manager telling me what to do. Nothing. Nothing! I just draw some stuff, put it up somewhere, and money comes from the sky.” - Taylor

For these contributors, the notion of employment rests on the distinction between paid and unpaid work, rather than on an employment contract. They consider themselves loosely affiliated with the firm when they receive payment for their work, but as we've seen, they are reluctant to claim much of a relationship with the firm that pays them. In this labor market, discussion of compensation is taboo, as workers worry about running afoul of the firm's non-

disclosure agreement pertaining to revenue.<sup>9</sup> As such, workers were not asked about revenue in detail, but instead their reliance on income from work in this market. In my sample, roughly 50% of workers fully supported themselves through revenue-sharing royalty payments received from the firm, a predictably high percentage given my oversampling of popular contributors. Such support is possible because workers are compensated generously for their efforts (25% of product-related sales), conditional on firm acceptance of the finished product and resulting sales numbers. These figures vary considerably across the three markets and over time, such that most contributors in the population do not earn enough to depend on this work alone.<sup>10</sup>

In the dominant model of compensation, the workers who receive revenue-sharing payments are those who are directly involved with the core production process. Groups of workers discuss compensation amongst themselves and set internal rates for revenue sharing (splitting the 25% revenue share among contributors), typically based on each member's relative contributions to production: modeling, texturing, animation, marketing, and so on. In most cases, these shares are even or correspond to hours worked, with more established contributors setting the terms for relative newcomers. Several workers reported disputes with at least one fellow contributor, but no one experienced disputes over payment with the firm itself. Through revenue-sharing percentages locked-in via the platform prior to selection, the firm chooses to avoid revenue negotiations between contributors, instead allowing workers to resolve disputes and distribute revenue on their own terms. While the revenue percentage is set in advance, creators are unable to predict compensation because conditions of acceptance and distribution are closely held secrets within the firm.

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<sup>9</sup> There is disagreement among participants over the disclosure permitted by the firm's NDA. Some claim they can talk about aggregate compensation, but not month-by-month or asset-specific numbers. Others claim that the NDA forbids any discussion of revenue. To minimize the risk of harm to participants in this study, I avoided asking about revenue figures altogether.

<sup>10</sup> One market offers the opportunity for initial windfall profits with a steep decline in revenue over the course of the year, while another presents opportunities for steady income throughout the year, but at a lower overall sum. Importantly, nearly all workers reported choosing markets based on their design motivations rather than compensation potential, although several participate in markets based on the latter.

One group of contributors developed a novel solution to the problems of unpredictable compensation. Their method is worth describing because it demonstrates how workers innovate on typical use of the platform in order to manage uncertainty in their work. In their approach, an inner-circle of contributors received larger shares for their efforts in producing a given asset, but a secondary group collected the minimum-allowed share, or token share, in exchange for promoting to their individual network of peer collaborators and end-users. Jason, a founding member, explained the logic, saying, “The way we thought it was fair was the whole goal of the group was to generate popularity and bring each other up . . . So people that looked at our designs could see our friends’ designs, could join our group, and it was all kind of like a hub for us.” Similarly, contributors frequently mention small-scale revenue shares for ancillary production tasks, such as translating promotional material for foreign consumers. When asked why primary contributors, who are often capable of increasing their own revenue share, instead offer shares to token contributors, Anthony responded, “It’s a lot more fun working together, actually. It’s more enjoyable to work with friends, to work on projects on which your friends can help you.” To realize the benefits of collaboration, workers organized along the lines of the platform, yet did so in a way that challenged the firm’s assumptions surrounding compensation for work produced.

In this case we can see the interpretive flexibility (Pinch and Bijker 1984) of a platform designed to provide one-off payment for piecemeal work, but reimagined as a more predictable employment relationship by its users. From the perspective of the platform and the firm, each of these individuals contributed to work tasks, yet the responsibility of most contributors was limited to promotion among their networks. At the same time, even the minimum revenue share has the potential to generate hundreds or thousands of dollars a year depending on total sales, thereby providing supplementary income while participants pursue other projects. Beyond the implications for compensation, this case demonstrates the centrality of an emergent form of teamwork to what was once envisioned, and designed, as a solitary work arrangement. Contributor communities figure prominently in efforts to change the parameters of this work.

*From Amateur to Professional: The Career Trajectories of Contributory Workers*

Participation in this contributory work extends from the most in-demand industry professionals to those just beginning their journeys in digital design.<sup>11</sup> To stress this point, any reader with an interest in creating digital goods on the platform can download freely available software tools, struggle through the production process, and start down the path of contributory work today. Expensive hardware and software are often used in high-skilled production, but the barriers to entry are quite low, making participation possible for most individuals with an Internet connection. The wide-range of talent and expertise is reflected in the equally broad collection of goods displayed on the digital storefront: industry-quality assets ready for distribution, imaginative, yet impractical artwork of contributors experimenting with their new skills, and first-attempt work-in-progress submitted by beginners. These goods represent different stages in a training process of which each contributor is a tacit participant. All contributors, whether beginners, intermediates, or professionals, make a career of game development or have plans to do so in the future, with their current work viewed as a stepping-stone to more secure employment. In this effort, they all struggled with variations on the same two questions: what is the next step in my career and how do I get there? To find a path forward, they participate in communities of fellow contributors.

Roughly one third of workshop contributors I interviewed began honing their craft within the last three years. Most of these contributors are waiting to see revenue from their contributions, yet they continue to make goods in hopes that the firm will select their work. One beginner, a texture artist named Scott, was interviewed on the day after his first asset was accepted for distribution. He was at once thrilled and perplexed, saying, “I was in tears and my wife was so

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<sup>11</sup> The formal distinction between amateur and professional is not necessarily meaningful to the participants. Those interviewed use the term “professional” as a description of behavior, to characterize those who want to collaborate; those who provide helpful feedback; those who don’t let competitive pressure influence their relationships. It can also mean anyone who works in the industry, either as an independent contractor or an employee. The game development industry frequently hires those without formal training or relevant credentials, but rather on the basis of a design or development portfolio.

happy for me . . . I got like two hours of sleep because my brain was racing with, you know, what am I going to do with this money and what am I going to do next? [ . . . ] It's hard for me not to be concerned. I basically shifted my whole career towards making these designs.” He goes on to suggest plans for the future. “I'm going to go back to art school, like maybe part-time and I want to become a better artist. Now, for the [platform] and just for personally, because it's what I should have been doing in the beginning.”

Some beginners, like Scott, have plans to seek formal design or programming education in the future, but all beginners rely on the training resources provided by the community: *YouTube* tutorials, FAQs, instructional discussions on message boards, critique from team members, and observing work-in-progress feedback. In this way, they resemble the earlier cohorts of now-professional game designers who trained through reliance on modding teams and instructional literature available online. In addition to these resources, Scott relies on his mentor, a professional 3D modeler who he met in the community. “I had a lot of help from [him] in the beginning . . . If I never spoke to him there would be no question that I would still be really delayed with my work, it'd still be another 6 months until I produced anything of the quality that I'm doing now.” Newcomers like Scott are largely unsure of the pathway toward professional content creation (for instance, they do not speak of developing a portfolio or networking with studios), but they have been exposed to professional practice through their reliance on community-provided resources.

Another third of those interviewed are at a stage of intermediate expertise. These individuals have one or two assets selected by the firm and are actively striving to contribute at a high level with regularity. They might have some formal training in a relevant field, but rely for skills enhancement on their own active participation in online communities, such as contributing to work-in-progress feedback sessions or design contests. As a result, they are likely to spend considerable time in volunteer staff positions within the community, roles that entail interaction with industry professionals. Lane, who, at the time of our interview, had just accepted an on-site

position with a prominent development studio, described his responsibilities in the community, saying “I used to make contests on [HUB1] to help new artists get in the [platform] . . . We had a deadline, some guides for people, and I got some more professional guys to work together with them. It was a really enjoyable thing. It lasted for two years.” Those at an intermediate stage are transitioning from merely drawing on community resources to contributing expertise themselves, a process that motivates direct contact with more experienced contributors.

Alongside financial reward on the platform, the primary focus of intermediate-level workers is on building their portfolio, a digital collection of their best projects that they can present to potential employers. They have learned that portfolios figure prominently in hiring decisions within the industry, a goal to which many aspire. They come in contact with professionals like Brad, who tell them, “Degrees are kind of looked at as a bad thing in some circumstances . . . A piece of paper does not guarantee a position, it’s all about your portfolio. If your portfolio is solid, it’s what you can *do*, and if you can do what they want, you’re good.” While they lack the experience of on-site employment, in some cases the quality of these workers’ assets is regarded as *better* than those produced by studios, a fact attributed to their relative lack of top-down creative parameters and time constraints. In terms of career progression, this freedom is both liberating and daunting for a self-taught 3D modeler like Matthew, who retains an unskilled service job alongside his contributory work. He describes searching for the next step in his career, explaining, “There’s no actual metric that’s visible to you to guarantee [success]. It’s the uncertainty. I know nothing’s for sure in life, but still it seems even sketchier than, ‘Hey, I’m at a traditional job, I want to work my way up.’ There is no avenue to do that. Creatively, it has been fantastic. An excuse to work on 3D and work on something you love is really great.” Despite their budding skills and expanding portfolios, beginners and intermediates like Scott and Matthew are unsure how to make the transition from lay expert to industry professional.

The final third of contributors are what I call professionals, those who have worked at one time or another for development studios, either as independent contractors or employees. These professionals represent the pinnacle of creativity and technical skill to which most content creators aspire. From their ranks come the most consistently successful contributors, although professionals who work full-time on the platform feel just as exposed to the vagaries of the firm and may struggle with career advancement. Their high-quality products and relative likelihood of success make them particularly visible in the community, and many participants told me I should interview one of the “professionals” or “industry guys” for my project. As is common in the industry, half of these workers have professional credentials relevant to game design, such as a Bachelor of Fine Arts in Game Design. In fact, many of them have been involved in game modification work since they began their training in the field, so the platform offers a novel take on a familiar type of production. Brad described his contributory work in contrast to his contract work, saying, “It’s not... I don’t know if I can say *easier*, but it’s more like the old-school method in the [platform]. It reminds me of when I was doing stuff for [game] as a modder, before I was a professional. There’s a bit of a nostalgia factor there too.”

Like those with intermediate levels of expertise, the professionals also engage in community-based training. In this role, they offer critiques on community message-boards, create written and visual tutorials of different production techniques, mentor promising beginners, participate in work-in-progress feedback sessions, and broadcast their work processes. In the last case, fellow contributors will tune in to interactive video streams of work demonstrations, sometimes with accompanying instruction by the professionals themselves. These community-support functions have mutual benefits for teachers and learners alike. Ronald, a professional who often broadcasts his work, explains a common motivation for expert participation in the community.

“You’ll get cool people who are trying to learn 3D or something and they will ask very specific and pointed questions . . . The goal really is to humanize someone who you otherwise wouldn’t see, like the artist who’s making the art. And if people can see you as a human instead of just

some random company putting stuff together, I think that has a lot of value for you, for the artist . . . . When you work at a studio, you never get to interact with the end consumer, you never get to interact with the person who plays the game. I think that's one of the strengths of the [platform], the strengths of user-generated content. You talk to the people who make the art and they're able to listen to your feedback and talk to you directly and tell you why they made those decisions."

Most of the professionals, like Brad and Ronald, find themselves between more stable employment opportunities, perhaps laid-off from on-site work or between freelance contracts, while a few moonlight as contributory workers to supplement their wages. When asked about their future job prospects, all of these workers express willingness to re-enter or maintain on-site employment within the industry. Following a popular trend among industry veterans, a few mention plans to start their own development studios with money earned online. Despite the profitability and flexibility of expert contribution to the platform, industry employment remains the standard of success in this line of work. In their current roles, the professionals are trying to predict the direction of the industry as it signals an embrace of user-generated content, while searching for the illusive, windfall profits contributory work can produce.

So far, we have discussed three types of uncertainty and the ways in which these are felt and responded to by contributors. Although mentioned only in passing, the community hubs that organize these collective responses are central to the story. We will now dive deeper to explore the role of these community hubs in organizing work beyond the firm.

## ***2. Community Hubs as Intermediaries in Online Platform Economies***

Community hubs are digital organizations that centralize information sharing and facilitate collaboration within online communities. They are the public meeting places of like-minded individuals who use the Internet as a central medium of interaction, whether for work, leisure, or both. These organizations can be operated as for-profit or non-profit entities, as stand-alone websites or components of larger platforms, and as permanent or ephemeral assemblages. All of the hubs that I encountered allow open-membership or participation, with open access to information. In some cases, they may organize commons-based peer production (Benkler 2006), but this is not required. They may take shape as forums for fans of a certain game or a

professional networking site for designers looking to collaborate. In the context of this online platform economy, these community hubs act as intermediaries between contributors and other contributors, between contributors and end-users, and between contributors and the firm. They do not sell work-related services, but instead provide a public sphere free of charge. In order to maintain operations, there are three ways in which these organizations may generate revenue: ad revenue from website traffic, service-provision fees through partnership with the focal firm, and/or donations from community members.

In the orbit of this online platform economy, collaboration and information flow through ten primary hubs. We heard from Lane earlier, as he described facilitating relationships between the community of amateur contributors and those with industry experience. Here, he describes his initial involvement with one of these community hubs, where the community pushed the boundaries of acceptable content and spread knowledge of the work process, even before the firm provided instructional documentation:

“Actually, in [HUB1] I was on in the beginning of [GAME1] . . . I was helping a lot. I was one of the first to make a lot of stuff on the [GAME1] engine, like compiling things. There’s no documentation on how to do some things. I was finding out by myself and I was posting everything that I was learning to people that wanted to do the same thing. In the end, the [HUB1] guys asked me to be a moderator on the [GAME1] section and right now I help take care of the forum [ . . . ] There was no documentation, there weren’t many tools to work on [GAME1]. You had to figure out a lot of stuff and a lot of stuff wasn’t supposed to be done. It could be done, if you know the engine, if you could code for the engine. For example, making a character and adding it to the game was kind of impossible at that time. There was no way to do it unless you knew how to code it. But there was no documentation about that, you needed to do trial-and-error.” – Lane

When it comes to shaping the work experience, the firm provides initial, limited support in the form of software development tools and rudimentary walkthroughs or FAQs. It also sets technical and design parameters within which workers must create (examples include the number of polygons rendered per frame on an individual asset or acceptable color palettes). However, these resources and standards quickly become outdated or irrelevant as contributors introduce innovative content and share their contributions with a community. Relatively more consequential for the organization of work is a mass of instructional material and public workshops provided by

peer contributors, like Lane, and distributed by community hubs. It is within these communities that workers find contributor-to-contributor learning and user-to-contributor feedback in place of interaction with the firm, collaborate to make compensation more predictable, and identify a pathway toward professional status in the industry. In these ways, the hubs serve an understudied, intermediary function in the contingent labor markets of online platform economies, one in which they temper the uncertainty of contributory work online. In this role, we might think of the hubs as *boundary organizations*, or intermediary organizations that manage relationships between actors with potentially oppositional goals (O'Mahony and Bechky 2008).

Initially, contributory workers on this platform may be wholly excluded from the industry work experience, yet they find a window to industry-standard practice in the hubs. In this pipeline, amateur artists are put in dialogue with skilled professionals and can benefit from their business and work-process expertise. Sam's career trajectory illustrates this pattern. He describes his introduction to the field, remarking, "I realized that there was [level-editing software] and I just started to play around with it, really. It wasn't anything serious, but as I realized that there are these communities that exist where you can show off your work and get feedback, I started to really get into it. I think from that point, I realized that I want to keep making maps and become an actual, professional level designer . . . It's all been learning through my own mistakes, through other people's mistakes, and then the feedback process. It's all self-taught." These days, Sam is a professional who has had multiple on-site employment and freelance jobs in level design, but without accredited training. He is currently unemployed (a common status in the volatile games industry), supported by revenue from the platform as he actively searches for on-site employment. Relying on self-taught expertise and community hubs for support, Sam represents the typical pathway from hobbyist to professional for these workers.

Furthermore, the goal of "acting professionally" through constructive, non-competitive feedback is widely espoused within these hubs. Reflecting on the role of hubs, the founder of one told me that "[HUB1] actually came to a point where we were teaching people some etiquette as

well as teaching them to play in their culture as they were. Probably 90% of [HUB1] creators will never make anything of any serious value, but they don't know that and I don't know that, sort of a thing, you know? It's how history plays itself out, but everybody is participating in this, more than just *playing* the game." Whether or not they make the transition to industry employment, contributors work together in the image of professional practice, with hubs as intermediaries at the center. The following section provides an example of collaboration organized through the hubs.

### *Collaboration in Community Hubs*

"Our most enduring sections on the site are the [assets], the maps, and our work-in-progress section in our studios. The studios are essentially groups where members can join together and then release collaboratively their work as what we call a 'studio release' . . . they produce content collaboratively and generally an [asset], for example, needs a modeler, a compiler, an animator, and then a few other roles, so that's one of our big sort of unique features . . . Feedback is clear when you're getting millions of downloads and everyone loves it. But to get actual critique from another professional, that's not something you're going to get on the [firm's platform]." – Paul

Production on the workshop has emerged, in one form or another, as a collaborative process. We can see this in the broad-based collaboration of mapmaking, the specialized division of labor on character design, and the individualistic, yet networked production of texture design. These collaborative arrangements were not preordained by firm decisions or even suggested by the software that organizes work submission. In fact, the earliest versions of the submission portals assumed solitary work, restricting revenue sharing agreements to a single submitter. Nonetheless, collaboration in this setting now entails the effort of large, geographically dispersed groups organized around the community hubs. These communities organize workers with a range of skills, including artists, programmers, and dedicated players, with considerable overlap among participants. More experienced participants take up management functions and provide direction to community-based projects, but work is, for the most part, self-organized by teams or individuals using the hub as a service provider.

Community hubs work to facilitate collaborative modes, while at the same time training contributors in professional practice. A good example of this is *playtesting*, the central aim of

which is to distill user feedback in a way that influences an on-going production process. This community-managed function mimics the iterative development process of environment artists and level designers at development studios (where in-office playtests are common during development), but depends on the infrastructure of text chat applications, networks of gameplay servers, VoIP discussion channels, and community hubs acting as facilitators. Beyond the networking technology, there are a few tools that are central to the collective effort of playtesting, including gameplay demos, an interactive feedback system, and heat-mapping software. In each case, the tools provide a bridge between those acting as testers and the primary contributors (level designers, environment artists, and other auxiliary personnel on the project team). These tools emerged from within the community in an effort to structure the freewheeling design process common in much of amateur game modification. That is, the community made a self-conscious effort to construct production in the professional image.

In playtesting, contributors regularly gather on community hubs to test members' contributions, providing written feedback, such as suggestions for gameplay or visual improvements, as well as diagnostic information via community-developed feedback applications. This community input is fundamental to the work that is eventually submitted to the firm. All of the mapmakers incorporate playtesting into their iterative production process, from the earliest layout stages to the wide-release and subsequent revisions. Mark, a self-taught creator with an advanced degree in physics, described the role of community playtesting through analogy to the scientific method, saying, "The test version is kind of like my hypothesis on how it's going to work. And the playtests are the data collection. And then after that it's just all analysis. And we have tools on [HUB3], they weren't available during development of the [project], but we now have the tools that actually help create more data." This data collection depends on the community-sourced testing of fellow contributors who offer their time and energy to peers. While the primary contributors have the final say on revisions, the production process is often shared publically. Mark capped his description of playtesting by explaining that the mapping community

“[is] pretty open. When we’re developing this project, we had brand new people who were coming in saying, ‘you know this is something that I feel would be really helpful,’ and then everyone was like, ‘yeah, yeah, it totally is.’”

As noted in the discussion of interactions with fellow contributors, community hubs structure collaboration outside of the mapmaking process as well. Other contributors develop the cosmetic assets, like clothing, described earlier. They organize collaborations using separate, yet functionally similar community hubs that organize large-scale creative efforts around a common theme, brand, or concept. As Tim, a 3D modeler currently studying software engineering, shows me the homepage of a community hub via screen sharing, he describes the structure of collaboration more broadly:

“This is where everybody posts their finished work and I guess the ideas and concepts that need to be claimed. And here is the biggest variation in skills, I think, because if you’re a beginner and you post here, typically beginners post more work-in-progress and more professional or more experienced people will post their finished products or close to finished products, but it’s definitely more open. It seems like for [another game] they actually have teams of people, they have a group and they’ll name themselves something . . . [We] don’t formalize groups of collaborators. Sometimes you work with other people and share venue on a project, like with a concept artist, but if anything the community is centralized around the [HUB4] thread.” – Tim

In the informal, temporary teams described by Tim, one worker, who might specialize in providing concept art, will create a sketch based around community-derived or independent ideas. In starting the process, he or she hopes to have the sketch used as the basis for a model. Perusing the recently posted concepts, a 3D modeler, who likes the art style or otherwise sees potential in the concept, will inquire with the original concept artist about a temporary partnership to realize his or her idea (perhaps including a texture artist or an animator in the temporary team). Screenshots and screen sharing will be exchanged as the object comes to life on independent screens. The team may post their work-in-progress to the hub or send it to a VoIP group chat, where professionals and beginners will leave their constructive (and occasionally, unconstructive) criticism. In this way, these hubs focus the collective effort of individual workers toward an idea and facilitate feedback around the resulting products. As spaces of the in situ construction of

expertise (Nelson and Barley 1997), these hubs allow workers to organize professional-style collaboration outside the boundaries of the firm, thereby allowing them to meet the increasing demands of competition in the markets for their goods and labor. As they occupy a liminal space, they also act as a venue for the productive convergence of firm and creator interests.

#### *Community Hubs as Boundary Organizations*

How should we treat these community hubs that demonstrate properties of intermediaries, yet are structurally quite distinct from those studied in earlier explorations of contingent labor markets? Drawing on earlier expansions of the social movement concept (Snow, Soule, and Kriesi 2004; Frickel and Gross 2005; Hargrave and Van de Ven 2006), O'Mahony and Bechky suggest that some social movements “organize not to protest established systems, but to further the collective production of scientific, artistic, technical, or general knowledge” (2008:424). Although their motivation may not be adversarial, these social movements are often put at odds with an established social system, in this case, the top-down, studio-based model of game production with clear boundaries between consumers and producers of games. Boundary organizations act as intermediaries that support converging interests between challengers and defenders, but allow for divergence to persist at a tolerable distance from collaborative projects. The result is that these organizations, like boundary objects (Star and Griesemer 1989), foster interpretive flexibility that makes conflicting perspectives compatible (O'Mahony and Bechky 2008). In the present case, community websites serve this boundary function, linking the firm's profitability goals and professional practice with the interests of open-source modification. Social movement and established interests find initial convergence on these websites, which act as hubs of talented and passionate creators eager to contribute to the games they love.

O'Mahony and Bechky (2008) study the creation of boundary organizations as a solution to problems of collaboration, but they do not evaluate the operating success of such organizations over time. In the present case, the long-standing boundary organizations demonstrate considerable variation in usefulness over time, with the current period of workshop production

constituting a new era in use. For instance, the firm hoped to bring some community functions within the boundaries of its platforms, a move seen as a threat to existing service providers. Strong commitments to existing community hubs meant that this effort at centralized service provision met with mixed success among users. Some efforts, like direct distribution of user-generated content (a function formerly provided by third-party hosting websites), saw wide adoption, while others, like platform support for training material and user-groups, were less favorably received. Where the firm has tried to centralize the training and coordinating functions via its platform, hubs persist as sponsors of open knowledge and facilitators of collaboration.

At the same time, several more seasoned participants suggested that their interest in active community membership is waning, as they've identified their tight-knit collaborative groups and are now comfortable with insularity. This is especially true as the general community of contributors continues to expand, bringing new actors to an already crowded marketplace. Chris, an industry-trained animator who stopped utilizing the hubs, remarked on the new community climate, saying, "You just go share your work and get feedback. It's a healthy community in that regard. Except when you're dealing with the workshop it's not healthy because everyone is trying to one-up you, backstab you, and beat you because everything is competitive, you know?" This perspective resonates with the few participants who label the current marketplace as a "wild west" environment. These individuals tend to be contributors who started using the platform before the present era of crowded participation.

Despite the growing reluctance of some veterans, many more maintain their commitment by contributing work-process knowledge, feedback, and exemplary content. Brian summarizes the position of most workers when he suggests, "I try not to think about the competition aspect very much. I just try to make things I like and want to see in the game just like everyone else. My fellow workshop contributors are some of the most talented, hardworking, and amazing individuals that I have ever known. Being able to foster community is so much more important to me than sequestering out of fear of competition." Paul, the founder of one community hub, sees

this commitment firsthand, claiming, “What’s remarkable to me is that I have this community that comes back every day and I still haven’t figured out why. Once you build this momentum, it never goes away. I don’t know why, because I thought we were obsolete by now, but we’re not.”

Boundary organizations make collaboration possible across groups with convergent and divergent interests, but they do not necessarily resolve conflict. This conflict can be seen either *within* one group, such as the creators who, like Chris, are dealing with increased competition in the markets, or *between* groups, as a publicized controversy over market emergence makes clear. In describing the rise of new occupations, Nelson and Barley (1997) note a process in which “people gradually become willing to pay ‘experts’ for goods and services that they formerly provided for themselves or received for free” (622). At issue was a recent effort to transform a market for freely available assets into one that could generate revenue for the publishing company *and* the contributors.<sup>12</sup> The resulting conflict gets to the heart of debates over open-source versus proprietary content. Boundary organizations were unsuccessful in efforts to maintain the conditions necessary for a working market in this space. They provided a platform for contributors and users frustrated with the changes in distribution, as well as for industry professionals who lauded the shift as one toward greater recognition, compensation, and support for user-generated content by publishers. Ultimately, tensions within the contributor community and vocal opposition from consumers torpedoed the firm’s efforts at greater monetization of user-modification. In this case, the hubs failed to support a transformation favored by established interests and instead played host to the sometimes self-contradictory values of the user-modification movement.

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<sup>12</sup> Unlike the three workshops examined in this paper, this short-lived marketplace lacked strict curation and instead allowed users to buy goods and services sold directly, but distributed through the firm’s platform. A few of the workers I spoke with were handpicked to participate, albeit unsuccessfully, in this endeavor. Upon closure of the market, the firm compensated these workers for their effort.

## Discussion and Conclusion

In their examination of alternative work arrangements, Katz and Krueger (2016) document an economy-wide shift away from traditional employment relationships, one in which net job growth between 2005 and 2015 was driven by the rise in independent contracting, temporary help work, work provided through contract firms, and work in online platform economies. Offering one possible explanation for the shift, the authors suggest a common refrain, that “technological changes may be reducing the transaction costs associated with contracting out job tasks, however, and thus supporting the disintermediation of work” (Katz and Krueger 2016). While this is part of the story, the present findings demand a more nuanced view of intermediation in the contingent labor market of an online platform economy. As the foregoing analysis makes clear, we are forced to see contributory work as neither “firm-generated production” nor “user-generated content,” but instead as the result of a triadic relationship between user-creators, firms, and community hubs acting as intermediaries. Contributors are a hybrid of producers and consumers, as they begin their careers as hobbyist modders, learn the skills of digital content creation, and earn income helping to build the games they enjoy. The firm functions in a curatorial role, designing the system of crowd-sourced production and compensating only those workers who make preferred products. This system depends on a boundary between worker and firm, one that is simultaneously supported and bridged by community hubs acting as boundary organizations. Taken together, these three actors organize work outside the traditional employment relationship.

How do workers experience their position in this triadic relationship? On the one hand, contributors are empowered to produce goods that they love, while learning professional practice, earning a living, and developing partnerships along the way. This is largely possible because they supplement one-sided relationships with the firm by establishing connections to peer collaborators or end-users via community hubs. As boundary organizations, the hubs produce new tensions as they help workers manage the uncertainty surrounding interaction, compensation,

and career progression. On the other hand, contributors remain exposed to the considerable uncertainty that accompanies production via online platforms. Commenting on the rise in transactional employment contracts, Kalleberg writes, “such contracts reduce organizational citizenship rights and allow market power and status-based claims to become more important in local negotiations” (2009:12). Interestingly, the community hubs provide a secondary source of citizenship outside of the firm, yet this status rarely affords bargaining power vis-à-vis the firm, as would be the case if workers held the rights of formal employment. While hubs may concentrate resistance to certain firm decisions, workers are largely at the mercy of the firm should they choose to contribute their time and energy. Although they are free to participate on their own terms, success depends upon an opaque decision-making process within the firm. Contributors are left with a sense of inconsequentiality as they attempt to refine their skills and achieve more secure employment.

This case suggests several developments in the organization of creative work through alternative arrangements. Beyond the firm, the industry as a whole stands to benefit from the decentralized pathway leading from amateur to professional. First, the introduction of these markets provided the impetus for accelerated community-based training within the population of would-be game developers. The early days of game-modification communities saw a form of individualized training that familiarized amateurs with the tools and tricks of the trade, but did not go so far as to inculcate the professional practice of asset creation that is common within firms. Modders who made the transition to working within firms possessed refined artistic or programming skills, but lacked an understanding of the division of labor used in different types of asset creation. Although they exhibit different, dominant modes of collaboration, the markets each play host to an industry-standard production process learned on the boundaries of firms, via intermediaries. Second, workers can improve their portfolios with the expectation of short-term compensation in lieu of formal employment. It should be said that while the latter is a widely shared goal, only four participants made the transition to permanent, on-site employment in the

industry. Workers cherish the flexibility of work on the boundaries of the firm, but nearly all workers covet the mark of professional status and benefits of security that come with on-site employment in the industry.

More broadly, we can see this employment relationship as yet another example of risk shifting from employer to employee in the new economy (Neff 2011; Davis 2016). While past work (Beck 2000, Hacker 2006) focuses on elements of compensation and care, such as defined contribution pension plans and health insurance, in this case we see a shift in risk related to the work task itself. Polanyi describes a similar state of affairs in the proto-Industrial putting-out system, writing “If supplies failed it was the cottager who was worst hit, for his employment was gone for the time; but no expensive plant was involved and the merchant incurred no risk in shouldering the responsibility for production” (1944:74). As in the putting-out system, the production risk is born primarily by individual workers while the firm profits from choosing proven suppliers. When paired with a crowd-sourced voting process, the firm can go a step further, picking only those workers who have demonstrated interest from the market of potential end-users. The efficiencies of this model come from the uncompensated time (spread across the population of contributors) spent making content that is never chosen by the firm as curator. The firm only pays contributors for what they deem to be successful attempts and does not bear the costs of failure. Transaction costs are low because quality control, compensation, and distribution are mostly automated via the platform. Thus, because of these economies, the production process can afford to be deliberate, broadly collaborative, and high quality at the work-group level. The result is that many people work for free with the vague hope of payment, complacent with the balance of leisure, work, and training that their production entails.

In this way, the present case can also be seen as a new iteration along the lines of Stark's (2001) heterarchical organization. When firms confront considerable uncertainty on their strategy horizon, they may attempt to maximize the search function of each unit within the firm.

According to Stark, "To cope with these uncertainties, instead of concentrating its resources for

strategic planning among a narrow set of senior executives or delegating that function to a specialized department, firms may undergo a radical decentralization in which virtually every unit becomes engaged in innovation" (2001). Here, we see the firm expanding its decentralization of innovation beyond traditional boundaries to include dispersed contributors and their corresponding work teams. In doing so, the risks of this heterarchical search are more widely dispersed across firm boundaries to include the task completion of individuals. The coordination required to manage interdependence is mostly facilitated by the online platform as monitor, with the firm acting as manager and contributors acting as autonomous units. But as we've seen in this case, the effective diffusion of work tasks relies on intermediaries as much as firm management via the platform.

As has been shown, community hubs help contributors manage the uncertainties of work outside the firm. If considered at all, online communities are typically thought of as tools that can be used for knowledge dissemination within the firm (Hwang, Sing, and Argote 2015). This has caused organizational sociologists and management scholars to overlook online communities as meaningful organizational forms in their own right. Firms looking to experiment with production through online platform economies should identify existing communities to act as boundary organizations when organizing work. Efforts to co-opt the functions of community intermediaries may find mixed success, so firms should avoid complete disintermediation via the platform. Where an existing community infrastructure is lacking, firms may also benefit from active sponsorship of these intermediaries as partners, whether through knowledge or revenue sharing. This is particularly important for firms that may be concerned about organizational citizenship in the absence of strong professional norms (Van Dyne and Ang 1998). Further, this case illuminates the fact that initial participation is not exclusively motivated by a short-term profit incentive. Workers often spend time on projects alongside a more permanent job, using community hubs to hone their skills and connect with fellow contributors, only to learn that they can earn money through the platform. Firms must recognize and promote these diverse

incentives, as well as the role played by community hubs in motivating commitment and structuring work online.

Finally, findings from this case force us to reconsider the relevance of firm boundaries for workers in the new economy (Davis 2016). When discussing contingent labor markets, there is a tendency in the sociological literature, as in official statistics and labor law, to dichotomize workers' experiences as either within or outside the boundaries of firms, as "independent contractor" or "employee" (Kalleberg 2009; Barley and Kunda 2004). When organizational sociologists add nuance to the traditional treatment of firm boundaries, it is in the context of interorganizational ownership and strategic alliances (Stark 2001; Powell, Koput, and Smith-Doerr 1996). In these accounts, workers may experience their position as relatively liberating or constraining, but the boundary of the firm is thought to be salient and meaningful. In this paper, we see workers who understand the employer-employee relationship in a way that complicates this straightforward picture of contingency. These workers operate on the boundaries of the firm, with neither the certainties of a traditional employment contract nor the identities of independent contracting, yet they are not adrift. Instead, they feel an affective connection, variously positive and negative, to their work, their collaborators, and the firm. This connection, along with the possibility for upward mobility through training, maintains worker engagement. While the firm plays no small role in facilitating this relationship, it is ultimately one that depends upon the support of community hubs as intermediaries. It can be difficult to identify these resources because they often come as afterthoughts to contributors and firms, taken-for-granted sources of knowledge and collaboration that can blend into the background. As Internet-mediated work arrangements continue to spread, future research should further dissect the role played by community hubs in structuring work alongside the black boxes of online platform economies.

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