

## Beyond Jobs: Kauffman Challenge Deliverables

### DOCUMENT 4c: Artificial Intelligence applications to exploit a CEDAH

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- *The project described was submitted to the National Science Foundation during the Kauffman project.*

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#### SUMMARY

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Today, across America, there are tens-of-millions of hours that people are available for ad-hoc work. Most of those hours will be wasted; the person won't get the personalized local employment they seek. Many will be underutilized; the individual will work well below their actual or potential skill level. Only a handful will be matched with rewarding work that progresses the person to their goals while aligning them with local employers' current needs.

35%<sup>1</sup> of Americans now seek at least some irregular work. Many can't work any other way; they have fluctuating medical issues, unpredictable caregiving/parenting commitments or ad-hoc training/studying patterns. Some are underemployed and need odd top-up hours elsewhere. These people aren't seeking a full-time, fixed-hours job; they need work that fits around them.

For lawyers, translators, web-designers and others with high skills, finding personalized hours is not a problem. They pull projects off sites like Upwork<sup>2</sup>, complete them at home in their own time, upload the work and get paid. Those whose current skills equip them to work in shops, warehouses, hospitality businesses, care homes, construction sites or other large sectors of employment have to be at a specific place at a given time to fit an employer's needs. This is a much bigger, exponentially more complex, part of labor markets. It is growing fast.

"Connective tissue" between low-skilled irregular workers and those who deploy them is inadequate. It often uses new computerized tools to exploit the workforce. For example; Uber<sup>3</sup>, the leading platform for "gig work" has been found using

sophisticated algorithms to apply the biggest pay cuts that their market will bear<sup>4</sup>, mislead workers to ensure an over-supplied market<sup>5</sup>, undermine alternative marketplaces<sup>6</sup> and identify, then deceive, regulators on the platform<sup>7</sup>.

This is a major societal problem: financial volatility, food poverty and angry politics are among well-documented impacts of current models of fragmented employment.

Britain's government has taken a lead on resolving the issue. A new kind of online platform was developed for the full spectrum of hourly labor outside the home. It is structured around protections, stability, control and progression for workers alongside alignment and quality for employers. It generates extraordinarily granular, real-time, data about local supply, demand and payrates. This can be parsed by types of work, localities, characteristics of workers and so on. It is a mine of actionable data for yet-to-be-developed AI tools.

With funding from the Annie Casey, Walmart, Kauffman and Wells Fargo philanthropies, this platform is to be launched in the US and open sourced. Pre-launch trading of hours will start with a group of employers in Los Angeles in 2019. Other states and cities are progressing toward launch.

This paper anticipates an action coalition around the AI capabilities for upskilling, development pathways and alignment balancing in any quality hourly labor market. There is also a role for AI in aspects such as; managing fragile early activity in any given city and targeting of interventions at the individual or area-wide level.

## Societal problem to be addressed by AI

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Government Office of Accountability highlight research<sup>8</sup> showing that, using a broad definition, over a third of Americans are now reliant on at least some precarious employment. This fast-growing group are barely served by public agencies set up to foster employment and growth. Individuals doing this work are often exploited by computerized platforms. Their skills and resourcefulness are too often wasted or misaligned. This is bad for productivity and causes enormous hardship.

### Who is working irregularly?

British government research identified 3 cohorts. (Percentage of total workforce in brackets):

- **Core irregulars:** Individuals who have fluctuating medical conditions, unpredictable care-giving or parenting demands, ad-hoc study opportunities or are striving to start a home business can all wake each morning not knowing if they will be available for work that day. 70%<sup>9</sup> of those outside the labor market are disabled or care givers. (20%)

- **Forced irregulars:** These are the underemployed<sup>10</sup>. Many are deployed by a primary employer in line with hour-by-hour need, may not find out until lunchtime if they have work today. If not, they need top-up hours elsewhere. (10%)
- **Voluntary irregulars:** Some workers, particularly the young, look at the jobs now on offer and conclude they will be more secure, and likely to progress, with diverse skills, relationships and experience from a personalized portfolio of employers<sup>11</sup>. (5%)

Some of these people are equipped to freelance from home. They are not our focus. Tens of millions of currently low-skilled breadwinners are surviving from day-to-day<sup>12</sup> finding “bits of work” in their communities. Research by Pew and others shows irregular employment is skewed towards the young<sup>13</sup>, women<sup>14</sup>, minorities<sup>15</sup> and the lowest-income households<sup>16</sup>.

There is a well-established shortage of data<sup>17</sup> about this workforce. Official Bureau of Labor Statistics' data gathering has not kept pace with the shift to irregular work<sup>18</sup>. This helps explain why official services for low-income Americans such as Public Workforce Boards<sup>19</sup> continue to focus exclusively on “job creation” and traditional credentialing<sup>20</sup>.

### **How does this workforce connect to employment?**

Anyone working ad-hoc outside the home will be using some combination of:

- **“Gig work” platforms:** Uber (for taxi driving)<sup>21</sup> is simply the highly valued trailblazer for thousands of online labor markets. Others include: Wag! (Dog walking)<sup>22</sup>, DoorDash (Food deliveries)<sup>23</sup>, Wonolo (warehouse work primarily)<sup>24</sup>, Sitter.com (Babysitting)<sup>25</sup>, Handy (Household tasks)<sup>26</sup>, Gigwalk (random checks on retailers)<sup>27</sup>.
- **Workforce scheduling:** This may be a manager making calls to tell workers their hours today in a small business or platforms to manage labor costs for corporates like Kronos<sup>28</sup>.
- **Verbal arrangements:** More of this work is found offline by simply asking local households and businesses if they need help. Much of the activity is then off-the-books<sup>29</sup>; contributing to a US Shadow Economy that World Bank researchers estimate to be 10-12% the size of GDP<sup>30</sup>. Urban Institute estimate 40% of Americans earn this way<sup>31</sup>.

### **Characteristics of current labor markets for “gig work”**

Since the Depression era, US government bodies have sought to maximize economic efficiency and personal opportunity while attacking shadow economies with a range of structural interventions. This started in response to 1930's unethical, exploitative, labor market practices.

In the current era, this mission is organized mainly around Public Workforce Boards. They provide training, recruitment, support and labor market intelligence gathering

at the state and local level. Significantly, each state workforce agency funds a universal online platform for matching any employer who has a job opening with candidates<sup>32</sup>. Examples include: Alabama JobLink<sup>33</sup>, IowaJobs<sup>34</sup> and CalJobs<sup>35</sup>.

But beside a few - very local and small-scale - experiments, the workforce system does not serve irregular workers or the organizations that deploy them. This has left the field clear for commercial services and the shadow economy. Inequities of shadow workers are well documented<sup>36</sup>, the problems of those seeking to do irregular work legitimately include:

- **Limited exposure to employers**: Anyone seeking personalized patterns of work around their life commitments can only trade across a small number of fragmented labor markets. (Otherwise, they risk getting a booking in one then being penalized for not being able to take an assignment in another.)
- **Lack of data and progression**: Business models of market operators demand a tight focus (TaskRabbit for instance narrowed its range of work-types in 2014 to cut marketing costs<sup>37</sup>). Data about need for a worker's services is negligible<sup>38</sup>, often intentionally misleading<sup>39</sup>. Chances of progression are all but non-existent for "gig workers".
- **Labor markets opposed to workers' interests**: "Gig work" companies have united in lobbying against basic protections, such as minimum wage, being applied to their workers<sup>40</sup>. A compelling business model for investors typically rests on commoditizing and disempowering workers. For example; Uber is not alone in applying unilateral pay cuts. This has been reported at least once at Lyft<sup>41</sup>, Doordash<sup>42</sup>, Instacart<sup>43</sup>, Amazon Flex<sup>44</sup> and TaskRabbit<sup>45</sup> for example.
- **Market instability**: Platforms that fail to deliver for investors can shutter overnight, depriving workers of their immediate flow of work, relationships and track record<sup>46</sup>.

### **Impact of low-quality irregular work on communities**

A swathe of the population that would have likely had a traditional job 10 years ago is now working precariously. Social science research on the impact reveals issues such as:

- **Disenchantment**: Current online "gig" marketplaces have high levels of churn. One-in-six platform works is new any given month. Half of participants quit any market in a year<sup>47</sup>. 25% of Uber drivers are new each month<sup>48</sup>. This limits capacity to build a track record and imposes overhead costs of switching between markets on workers.
- **Rapidly accelerating financial volatility**: Bodies like the CFED show food poverty and so many households only an illness, breakdown or missed check away from homelessness<sup>49</sup>.
- **Angry politics**: The OECD report the rise of non-standard work as the biggest single cause of inequality worldwide<sup>50</sup>. Economic anxiety<sup>51</sup> correlates to extreme political views.

## Needs AI must address

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Attempts to alleviate problems<sup>52</sup> for this workforce have had limited success. Many interventions are possible<sup>53</sup>. But the cornerstone issue is: quality of marketplace. Britain's government took a worldwide lead on developing markets that profoundly empower workers, driving up workforce quality and alignment to attract employers. US public bodies have the heft and motivation to launch similar platforms. Such markets support any intervention and generate uniquely actionable data.

### **A new kind of hourly labor market**

Someone in a job typically enters the labor market every few years when it is time to move on. "Gig workers" can be in-and-out several times a day in search of a booking. The breadth, depth, neutrality, sophistication and overhead of the markets they access determine life chances.

The entire spectrum of hourly work needs a new kind of labor exchange under local control. These markets must allow anyone to sell hours they choose, on their own terms, across as many types of work as they wish, with localized data underpinning progression to better skills and pay.

For employers, booking extra staff has to be one-click easy; nurturing pools of workers towards regularity should be stimulated. Intermediaries must be incentivized to act as employer-of-record; vetting, supporting and payrolling work-seekers. Any intervention should become uniquely cheap to target, administer and monitor. Targeted upskilling can become individualized and data-driven.

An empowering market must be "horizontal" (all types of work). That allows each person to (a) offer their full range of skills and abilities seamlessly (b) constantly progress to better paid or more stable work-types while retaining older training as a fallback if bookings are insufficient.

This core platform exists and is to be open sourced. Called a CEDAH (**Central Database of Available Hours**), it has been Americanized with philanthropic funding. Because this kind of platform is so different from current conceptions of narrow-focus, commercial, "gig work" labor exchanges, we ask reviewers to watch two short videos of the markets in action<sup>54</sup>.

### **Data generation**

It is hard to overstate the granularity of data that markets like this are capable of capturing. Payrates, locations, worker characteristics and other obvious data points about any booking are a given of course. It also knows the terms of employer/employee relationships being formed (unlike commercial exchanges, these are actively encouraged). And it captures the nuances of each worker's

willingness to work. For example: How far will they travel for any given rate of pay? What period of notice or number of hours in a booking will they accept and, again, how does that change if there's a pay increase or a preferred employer? How far ahead is availability known?

Each worker in this type of market may have the skills for dozens of types of work but choose to only have half of them active at any time. We have to store those decisions for bulk analysis.

A market like a CEDAH can underpin a range of aggregated data tools. The most immediately insightful is Utilization; the proportion of hours-offered by workers to hours-booked by employers. Utilization needs to be mapped by any combination of; skills, type-of-work, geography, time-of-day, day, or worker characteristics (military veterans or youth for instance).

### **Implementation of an empowering hourly labor platform**

Technology is not enough. There have been thousands of elegantly designed new labor markets in the last ten years that have failed to attract enough employers and workers to reach critical mass. Markets like ours have an added complexity; we incentivize intermediaries (which can be staffing agencies, public bodies or employment charities) to act as employer-of-record, vetting and payrolling workers. We need all three groups aligned – at significant scale – before launch.

Learning from the UK shows markets like this cannot start small in any city. To explain this, we use the Expedia analogy. Millions of us book vacations through a site like Expedia. It relies on an underlying database (the travel industry's Global Distribution System<sup>55</sup>). That is how it can offer so many interlinked, priced, genuinely available and easily booked choices; for flight seats, hotel rooms and rental cars for any trip. A CEDAH is the equivalent underlying database for the many-times more complex needs of hourly labor. Intermediaries are our equivalents of Expedia.

But imagine the user experience if Expedia had only a tiny handful of hotels and planes in the database. It would keep returning a "*we have no matches*" message. Sophisticated services like this have to start with immediately deep databases of users. That was relatively easy in the concentrated world of hotel chains and global airlines. It is much harder in the fragmented world of diverse hourly labor in any city. Uber and their competitors typically subsidize massively to get to critical mass in each city<sup>56</sup>. They then recoup the outlay in fees extracted. This is not an option for any market seeking to sustainably drive up wages and foster economic growth.

For us, launch in any city involves aggregating employers, educators, unions and public agencies seeking a better labor market. We have learned to focus on mid-size employers of flexi-labor, those not big enough to reap the enormous economies of scale from aggressively scheduling a workforce through tools like Kronos. We need AI tools to aggregate very small businesses.

Public Workforce Boards, accountable to governors and mayors are uniquely equipped for this aggregating. Although their federal funds can only be used for traditional job creation, Government Office of Accountability have made clear the boards risk irrelevance to growing numbers of workers and businesses<sup>57</sup>. Each board has relationships, credibility, neutrality and stability. Kauffman Foundation published our open source manual “*Launching a Market for Irregular Employment; a guide for states, counties & cities*” in July 2018. It features workplans and forewords from Mayors Garcetti of Los Angeles and Garcia of Long Beach<sup>58</sup>.

Workforce Boards are squeezed on funding. They need to report outcomes and understand how to target interventions – by themselves or charities with which they work. Because of this, the technical need for solving “gig work” problems includes a need to process then identify patterns and anomalies that justify action by public agencies according to the criteria of each.

### Proposed research into AI tools

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We will build a coalition ready to sustainably tackle the overwhelming problems faced by today’s precarious “gig” workers. After this project, there will be an openly published specifications for AI tools for any granular hourly labor market built around worker empowerment and real time data. There will also be documented functioning technology that can underpin those tools. Involvement of bodies from around the US will ensure broad reach.

### **Research outputs**

The need for new models of irregular employment is overwhelming. They fall into four categories:

#### **a) Raw materials**

These are our findings from detailed engagement with organizations that deploy flexible out-of-home labor around Long Beach/Los Angeles. We will also engage with unions, community colleges and other labor market stakeholders. Questioning will focus on areas like (a) what could you contribute to a market for hourly labor committed to empowerment and how (b) what would you need from the market in terms of functionality, data and analytics?

Los Angeles is just one area economy to be targeted. We will also bring in other state and city bodies who are interested and demonstrably want to engage but with which we cannot fund any activity currently.

All this will inform the following two steps. But it will be published in its own right. It may provoke other ideas elsewhere.

## b) AI tools for the empowered irregular workforce

Further development of AI concepts will be core. Discussions with stakeholders around LA so far reveal a need for tools like:

### i) Indexes:

We need to assemble tangible benchmarks around a range of activity. For example:

- **“Launchpad” index:** What types of bookings can launch each worker towards their personal goals and how effectively? A crude example: doing bookings as a contact center agent involve structured conversations with the public. Event stewarding demonstrates an ability to work outdoors with the public. Taken together; how much of a launchpad are they for more highly paid work as a market researcher? There will be many millions of routes for progression to be divined in our firehoses of market activity data.
- **Progression index:** Applied to sectors and companies, how much does that work contribute to broad onward progression, possibly in ways not anticipated?
- **Control index:** Some skills enable work which can be fitted around each worker’s availability. For example; some firms will allow outbound sales agents to work when they like. Other sectors such as distribution need staff at precise times. We need to analyze this factor for each sector to guide people who need to set their own hours.
- **Stability index:** Other irregular workers seek stable hours. Some sectors are clearly more useful for them and the system should be constructing a path into them, in line with the person’s preferences. We need to categorize each type of work by its local likelihood of delivering stable hours. Crudely, as one example, hospital nursing would score highly.
- **Compatibility indexes:** In the post jobs, multi-employer world, what percentage of the competencies required for national park ranger bookings does someone who can demonstrably operate a pallet-loader and handle cash with demonstrated willingness to work outdoors have? Currently no-one knows. Our markets can capture the raw data. AI will make it actionable.

### ii) Predicting the market

Tools to anticipate what will happen in financial markets are a staple of Wall Street. We can see equal sophistication for hourly labor. For example; we need a way to extract and intuitively present data on issues such as:

- **Causal relationships:** By taking in data from external sources, AI should be able to predict the need for specific skills. For instance, what is the relationship between publicly available data on number of ceremonies at wedding venues and local need for “cater waiters”? AI should be able to marry past trends in hospitality staff demand/supply and pay rates with historic numbers of weddings to forecast patterns – and skills needs.

- **Latent skills**: An empowering labor market allows workers to turn types of work for which they are qualified off. For instance; a young woman may have retail skills but have progressed to bookings as a receptionist and five other disparate roles. We need to show retailers what pay increase per hour in any area would tempt enough of these disparate individuals back to checkout operations alongside their newer skills. As the other side of this; we need to show each worker which skills it is in their interests to turn back on.
- **Foreseeing demand**: Scaffolders can't work when it rains. That's easily provable by aligning weather data with their collective patterns of bookings. There will be far more esoteric - but equally useful - data to be unearthed across other sectors when we plug into external sources with tools to seek patterns in an underlying market.
- **Demand stimulation**: To continue the above example: What types of work do scaffolders turn to in bad weather? Are they flooding other sectors to the detriment of lesser-skilled individuals reliant on that work? Is there alignment with scaffolders' diverse skillsets in unrelated sectors which the system could turn into a compelling business case for employers with high control and compatibility indexes at this time?
- **Business cases for interventions**: Who in the market is not getting booked? Isn't seeing an increase in wages? Why in each case? What commonalities could be tackled systematically? Lack of childcare can often be deduced from high rates of sudden cancellations of bookings outside school hours for example. If AI could prove that was the case, a philanthropy or public body might wish to subsidize childcare within periods of work for defined individuals in the market. Again, there are thousands of scenarios to be modeled. Users could be polled as part of this so the AI could test scenarios.
- **Launching a market**: A new market needs to get to depth and breadth as fast as possible. Until critical mass is reached, it is of limited value and risks losing all users. AI tools need to parse the skills/patterns and availability/parameters for accepting work for the hours offered in the database to understand which further employers it has capacity to serve immediately. It likewise needs to understand what further skills/geographies/ patterns of availability of workers will allow expansion of use by the existing employers?

### iii) Personal pathways

Using inputs like the above and local payrate/utilization data, Artificial Intelligence can build stepping stones through a range of work types to help any individual reach their goals. For example: *"I currently do deliveries by bike, I want to be nurse"*.

That pathway might entail ensuring the candidate had enough reliable delivery bookings to earn vetting for deliveries between hospitals (for which we can model the demand in her travel area at times she wants to work). We then need to identify and budget training perhaps as a hospital receptionist, because local projections show high utilization about the time she would qualify.

Other pathways could include: *“I want to try the most diverse range of bookings possible while I figure out a career path but I have to clear \$400 a week”. “I need work on transport routes as I don’t have a car.” “I need to develop skills that complement those my wife is acquiring to minimize risk in our household.” “I want to move to within a mile of the sea, where will my skills earn the most?”* And so on. It all requires analysis applied to our minutely detailed data.

### c) Foundational technology to capture the data

A core challenge is the amount and frequency of data generated. Traditional employment moves at a glacial pace by comparison. Someone progressing through jobs typically enters the labor market every few years when it’s time to move on. Someone in irregular work can be in and out of the labor market several times a day in search of their next assignment. Employers of this labor flex their requirements hour-by-hour. This creates huge opportunities for AI to exploit. But the data has to be made tangible first.

We uniquely have an early stage market that will operate in the Los Angeles area, generating millions of datapoints. We will further develop the technology ahead of open sourcing so that it catalogues every conceivable piece of actionable intelligence in a separate reporting database that can be interrogated without load on the main market system.

This will entail:

- **Capture of additional data:** to take one example; we need to store hours when each worker was available for work but didn’t get booked. What patterns of unexploited opportunity might be found there for employers?
- **Schema construction:** We need to test options for ordering and prioritizing data.
- **Protecting anonymity:** Obviously no search of market data, including by bots, must allow any one person or company’s patterns of activity or income to be revealed. At it’s simplest this can be done with a rule such as *“Any search can only be fulfilled if the biggest contributor to the pool of data returned accounts for less than 30% of the total outputs.”* But this kind of crude barrier can be gamed with overlapping queries that allow a picture of one user to be pieced together. We need to plot AI that calculates across all the diverse enquiries at any time, where might someone’s activity be leaching out?
- **Raw data outputs:** Data to be processed by AI tools must also be available for traditional enquiries such as a worker seeking to know *“How much would my earnings go up or down if I took my skills to the market around my Mother’s house in Pomona next month?”*. A complication for us is that many of our users are technologically unsophisticated. We have to present data graphically with helptext. We also have to facilitate easy API access for other

applications. This requires refinement of our data specifications of which AI readiness is one part.

#### d) Wider coalition

Los Angeles has its own unique requirements. Any project must involve other cities and states to ensure broad ranging tools are developed.

### **Broader Impacts of AI Work**

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No credible commentator believes irregular work will stop growing. Regular work in a fixed place creates a business case for automation. It is unpredictable tasks where humans have an edge. For example; robots are now economical to lift, dress and serve residents in a care home. They are ill-suited to the diversity of work involved in on-call home visits. Anyone building an empowering market for responsive work will face the challenges we address.

We see the wider impacts in three areas:

#### **1) Raising awareness of possibilities**

Needs of irregular workers are so often overlooked in formulation of policy, employment support and public assistance schemes. The subject is too data-deficient, amorphous, costly to tackle and often alien to the experience of officials who have taken a succession of jobs for granted. This project can dramatically make a business case for getting behind irregulars to boost outcomes.

For example; bodies like the Public Workforce System are struggling to understand how they can cost-effectively extend their aims of upskilling, supporting struggling workers and gathering local labor market intelligence to a new era of splintered working. Our work will show how they could cost effectively do this by overseeing an hourly labor market for their area, just as state workforce agencies currently each commission an online platform for all types of jobs.

#### **2) Tools for adjoining projects**

Any solution to the problems of irregular workers has to be technology based; each transaction is so complex and subjective. But many people doing irregular work who most need help are unfamiliar with computers, many are illiterate or have poor English. This paradox runs through our work. It forces us to focus on tools like simplified interfaces for early-state users, managing peer navigators and “work buddies” (humans who the system can rely on to help another user) and the simplest possible wording/displays for what may be alien concepts.

## Merits of an AI project

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Our “Elevating the Irregular Workforce” project focuses on a new aspect of data science: the extraordinarily rich information produced by any hourly labor platform offering work-seekers state-of-the-art tools for control and progression. Such platforms are in their infancy in the US. But the nation’s public employment services are particularly well suited to instigating them.

### **1) An emerging area**

In data terms, we compare this opportunity to a comparable revolution in Wall Street 15 years ago. As exchanges become increasingly sophisticated, with more granular pricing, the ensuing data could be mined for arbitrage openings, creation of new investment products and speculation opportunities. The resulting activity has enormously enriched sellers in those markets.

As with financial exchanges, hourly labor market data can be fine-grained and instantly actionable. Because sellers (work-seekers) interact daily with the market and can opt to devolve controls to a trusted algorithm, outputs of AI tools will impact swiftly. For example; a worker may specify *“Only when beautician bookings - in my travel area, at times I want to work - deliver a payrate exceeding the projected mean hourly rate of all my other current types-of-work, will I be available to do home beauty treatments”*. Currently, this kind of opportunity is inconceivable for marginalized “gig workers”. This project could create the architecture, specifications and user-friendly interfaces to make them routine.

That requires collection, structuring, storage, processing and presentation of data using market specific tools that don’t yet exist. Our transactions are multi-dimensional compared to digital exchange of stocks, bonds or other financial assets.

### **2) Social and economic need**

There are many theoretical exercises around possibilities for exploitation of data streams. AI in support of irregular workers is urgent and practical. Irregular employment is driven by fundamental factors such as; new technologies, deregulation of labor markets, decline of unions and automation increasingly supplanting traditional employment.

As the New York Times noted<sup>59</sup> in August 2018 *“In the last 10 years, 94 percent of net new jobs have appeared outside of traditional employment. Already approximately one-third of workers, and half of young workers, participate in this alternative world of work, either as a primary or a supplementary source of income.”*

There is a growing body of data science focused on exploiting this workforce to create profitable labor exchanges. It is a secretive world. But occasional insights can be gleaned, for instance from a 2018 Vanity Fair article<sup>60</sup> in which a former insider documented a casual approach to developing software detrimental to workers. The article stated; *“Gig-economy companies like Uber and Instacart are on the verge of overtaking the traditional economy. And the only people who understand the threat are the ones enabling it.”* Our work can be a tangible intellectual counterweight to these advancing “dark arts”.

Public agencies, which have historically provided alternatives to rapaciously commercial labor market practices, are the sleeping giants in this transformation of work. They are tied by out-of-date rules, lack of data and absence of a business case for intervention that would support their objectives of individual betterment and economic growth.

America’s locally accountable, often dynamic, public workforce boards are uniquely well placed to give businesses and work-seekers the choice of a broad and empowering hourly labor exchange. They already do this nationwide for traditional employment<sup>61</sup>. After new marketplaces created in British government programs were to be offered worldwide, British consulates identified America’s workforce boards as having the best conditions for immediate exploitation. This project could give them the intellectual underpinning to move towards sustainable, large-scale, support for the precariously employed.

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<sup>1</sup> 35% of Americans: THE CONTINGENT WORKFORCE: Size, Characteristics, Earnings, and Benefits. Government Office of Accountability: GAO-15-168R: Published: Apr 20, 2015. Publicly Released: May 20, 2015. <https://www.gao.gov/products/GAO-15-168R>

<sup>2</sup> Upwork: <https://www.upwork.com>

<sup>3</sup> Uber is explained at: <https://en.wikipedia.org/wiki/Uber>

<sup>4</sup> Pay cuts: Uber Drivers Plan Boycott After Fare Cuts Slash Their Earnings to Below Minimum Wage

Observer

By Sage Lazzaro

1/19/16

<https://observer.com/2016/01/uber-drivers-plan-boycott-after-fare-cuts-slash-their-earnings-to-below-minimum-wage/>

<sup>5</sup> Mislead workers: How Uber Uses Psychological Tricks to Push Its Drivers' Buttons

New York Times

By Noam Scheiber 4/2/17

<https://www.nytimes.com/interactive/2017/04/02/technology/uber-drivers-psychological-tricks.html>

<sup>6</sup> Undermine alternative marketplaces: Uber's 'Hell' program tracked and targeted Lyft drivers

Engadget

By Mariella Moon 4/13/17

<https://www.engadget.com/2017/04/13/uber-hell-program-lyft-drivers/?guccounter=2>

<sup>7</sup> Uber deceive regulators: Greyball: how Uber used secret software to dodge the law

The Guardian

By Julie Carrie Wong

3/4/17

<https://www.theguardian.com/technology/2017/mar/03/uber-secret-program-greyball-resignation-ed-baker>

<sup>8</sup> 35% of Americans: We use the broad definition of this workforce rather than their tax status (if any) or formal categorization. See: CONTINGENT WORKFORCE: Size, Characteristics, Earnings, and Benefits. Government Office of Accountability: GAO-15-168R: Published: Apr 20, 2015. Publicly Released: May 20, 2015.

<https://www.gao.gov/products/GAO-15-168R>

<sup>9</sup> 70% are disabled or care-givers: Who is Out of the Labor Force?

Diane Whitmore Schanzenbach, Lauren Bauer, Ryan Nunn and Megan Mumford

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The Hamilton Project

8/17/17

[http://www.hamiltonproject.org/papers/who\\_is\\_out\\_of\\_the\\_labor\\_force](http://www.hamiltonproject.org/papers/who_is_out_of_the_labor_force)

<sup>10</sup> Underemployed: This often covers individuals in a job. See for instance: Obama blasts Staples, and reveals larger partisan divide over workplace

The Washington Post

By Paul Waldman

2/11/15

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<sup>11</sup> Voluntary Irregulars: The most detailed attitudinal research appears to have been in Britain. It showed conclusively that many people who could do a traditional job would prefer a portfolio of employers, largely because they didn't believe they could progress through a traditional job. See for instance: RESEARCH INTO THE POTENTIAL TAKE UP OF SLIVERS OF TIME WORKING Conducted on behalf of London Borough of Newham by the School of Health and Social Sciences, Middlesex University

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<sup>12</sup> Surviving from day to day: See for example: Steady Jobs, With Pay and Hours That Are Anything But

The New York Times

By Patricia Cohen

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[https://www.nytimes.com/2017/05/31/business/economy/volatile-income-economy-jobs.html?hp&action=click&pgtype=Homepage&clickSource=story-heading&module=second-column-region&region=top-news&WT.nav=top-news&\\_r=1](https://www.nytimes.com/2017/05/31/business/economy/volatile-income-economy-jobs.html?hp&action=click&pgtype=Homepage&clickSource=story-heading&module=second-column-region&region=top-news&WT.nav=top-news&_r=1)

<sup>13</sup> Skewed towards the Young: Why Millennials are facing the scariest financial future of any generation since the Great Depression

Huffington Post

By Michael Hobbes

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<sup>14</sup> Skewed towards Women: Helping Bridge the Pay Gap, More Women Are Taking on Side Hustles Than Men

Career Builder

By Ladan Hayes

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<sup>15</sup> Skewed towards Minorities: Gig Work, Online Selling and Home Sharing

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<https://www.pewinternet.org/2016/11/17/gig-work-online-selling-and-home-sharing/>

<sup>16</sup> Skewed towards Lowest income households: The Gig Economy's False Promise

New York Times

By The Editorial Board

4/10/17

[https://www.nytimes.com/2017/04/10/opinion/the-gig-economys-false-promise.html?\\_r=1](https://www.nytimes.com/2017/04/10/opinion/the-gig-economys-false-promise.html?_r=1)

<sup>17</sup> Well established shortage of data: We're doing a terrible job of measuring the modern workforce, and the feds know it

Washington Post

By Lydia DePillis

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[https://www.washingtonpost.com/news/wonk/wp/2015/10/09/were-doing-a-terrible-job-of-measuring-the-modern-workforce-and-the-government-knows-it/?utm\\_term=.ad5e5259a918](https://www.washingtonpost.com/news/wonk/wp/2015/10/09/were-doing-a-terrible-job-of-measuring-the-modern-workforce-and-the-government-knows-it/?utm_term=.ad5e5259a918)

<sup>18</sup> Not kept pace: The Economy's Missing Metrics

New York Times Magazine

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<https://www.nytimes.com/2015/07/05/magazine/the-economys-missing-metrics.html>

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<sup>19</sup> Public Workforce Boards: The Public Workforce System

By The United States Department of Labor

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<https://www.doleta.gov/business/pws.cfm>

<sup>20</sup> Can only be used for traditional job creation: The workforce system is governed by six performance measures, available at: WIOA Performance Indicators and Program Specific Performance Measures

United States Department of Labor

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[https://www.doleta.gov/performance/guidance/tools\\_commonmeasures.cfm](https://www.doleta.gov/performance/guidance/tools_commonmeasures.cfm)

<sup>21</sup> Uber: <https://en.wikipedia.org/wiki/Uber>

<sup>22</sup> Wag: [https://en.wikipedia.org/wiki/Wag\\_\(company\)](https://en.wikipedia.org/wiki/Wag_(company))

<sup>23</sup> Doordash: <https://en.wikipedia.org/wiki/DoorDash>

<sup>24</sup> Wonolo: <https://www.wonolo.com/>

<sup>25</sup> Sitter: <https://www.sitter.com/>

<sup>26</sup> Handy: [https://en.wikipedia.org/wiki/Handy\\_\(company\)](https://en.wikipedia.org/wiki/Handy_(company))

<sup>27</sup> Gigwalk: <http://www.gigwalk.com/how-it-works/>

<sup>29</sup> Off the books: <https://www.finder.com/side-hustle>

<sup>30</sup> The World Bank is the main investigator of Shadow Economies globally. Their research expert is Freidrich Schneider. In 2011 he sized the US Shadow Economy by 2007 at [9% of GDP](#) (page 37).

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This seems to be the Bank's most recent work on the US shadow economy. There is widespread agreement it has [grown since then](#). Some experts think it [may have doubled](#).

<sup>31</sup> 40% of Americans: See Table One on page four of: Informal and Nonstandard Employment in the United States  
Implications for Low-Income Working Families  
The Urban Institute  
By Demetra Smith Nightingale and Stephen A. Wander  
August 2011 Brief 20  
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<sup>32</sup> Universal online platform: Career onestop: your source for career exploration, training and jobs  
USDoL  
<https://www.careeronestop.org/jobsearch/findjobs/state-job-banks.aspx>

<sup>33</sup> Alabama Joblink: <https://joblink.alabama.gov/ada/r/>

<sup>34</sup> Iowajobs: <https://www1.iowajobs.org/jobs/login.seek>

<sup>35</sup> Caljobs: <https://www.caljobs.ca.gov/vosnet/Default.aspx>

<sup>36</sup> Well documented: See for example: Out from the shadows: domestic workers speak in the United States  
Open Democracy  
By Aj-Jen Poo  
6/16/17  
<https://www.opendemocracy.net/en/beyond-trafficking-and-slavery/out-from-shadows-domestic-workers-speak-in-united-states/>

<sup>37</sup> Taskrabbit reduces tasks available: TaskRabbit pivots, launches on-demand service for cleaning, handiwork, moving, & errands  
Venture Beat  
By Harrison Weber  
7/10/14  
<https://venturebeat.com/2014/07/10/taskrabbit-pivots-launches-on-demand-service-for-cleaning-handiwork-moving-errands/>

<sup>38</sup> Data is negligible: See for example: How Uber money dominates and distorts economic research on ride-hailing platforms  
By Norbert Haring  
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<http://norberthaering.de/en/32-english/news/920-uber-research>

<sup>39</sup> Intentionally misleading: See for example: The dark side of 'sharing economy' jobs  
Washington Post  
By Catherine Rampell  
1/26/15  
[https://www.washingtonpost.com/opinions/catherine-rampell-the-dark-side-of-sharing-economy-jobs/2015/01/26/4e05daec-a59f-11e4-a7c2-03d37af98440\\_story.html?utm\\_term=.4ee32d77ee36](https://www.washingtonpost.com/opinions/catherine-rampell-the-dark-side-of-sharing-economy-jobs/2015/01/26/4e05daec-a59f-11e4-a7c2-03d37af98440_story.html?utm_term=.4ee32d77ee36)

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<sup>40</sup> Lobbying: See for example: Gig-economy giants ask California to save them from a ruling that may turn their contractors into employees

LA Times

By Josh Eidelson

8/6/18

<https://www.latimes.com/business/la-fi-contract-workers-20180806-story.html>

<sup>41</sup> Lyft: Lyft Just Slashed Driver Pay Again, And Everyone's Pissed  
Valleywag

By Kevin Montgomery

9/25/14

<http://valleywag.gawker.com/lyft-just-slashed-driver-pay-again-and-everyones-pisse-1639225232>

<sup>42</sup> Doordash: Fighting Back Against Doordash Pay Cuts  
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[https://www.reddit.com/r/doordash/comments/8hks9x/fighting\\_back\\_against\\_doordash\\_pay\\_cuts/](https://www.reddit.com/r/doordash/comments/8hks9x/fighting_back_against_doordash_pay_cuts/)

<sup>43</sup> Instacart: This Startup Is Cutting Workers' Pay Rate by 63%  
Money.com

By Kerri Anne Renzulli

3/11/16

<http://money.com/money/4256223/instacart-worker-pay-cut/>

<sup>44</sup> Amazon Flex: The issue has been cutting driver pay so that tips paid by customers can effectively be retained by the company. See for example: Where does a tip to an Amazon driver go? In some cases, toward the driver's base pay

Los Angeles Times

By Johana Bhuiyan

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<https://www.latimes.com/business/technology/la-fi-tn-amazon-drivers-tips-20190207-story.html>

<sup>45</sup> Task rabbit: Task Rabbit quietly doubled the cut it takes from many of its Workers  
Fast Company

By Jay Cassano

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<sup>46</sup> Shutter overnight: See as one example of thousands of closures: The First Domino Falls in the Gig Economy: HomeJoy Shuts Down

TriplePundit

By Nithan Coca

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<sup>47</sup> Half of participants: Page 2 of report: The Online Platform Economy: Has Growth Peaked?

By Diana Farrell and Fiona Greig of the JP Morgan Chase and Co Institute.

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<https://www.jpmorganchase.com/corporate/institute/document/jpmc-institute-online-platform-econ-brief.pdf>

<sup>48</sup> 25% of Uber drivers: Uber's Ever-Renewing Workforce: One-Fourth Of Its Current U.S. Drivers Joined Last Month

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<sup>49</sup> Food poverty and impacts on households: The United States of Financial Insecurity

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<sup>50</sup> OECD report: Temporary and part-time jobs surge promotes inequality, says OECD

Guardian

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5/21/15

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<sup>51</sup> Economic anxiety: The Economic Anxiety Index, Explained

Marketplace and Edison Research

By Christopher Furlong

10/26/15

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<sup>52</sup> We maintain a table of categories of attempts to alleviate problems for gig workers at:

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<sup>53</sup> We display the table of categories of interventions to support irregular workers developed

in British government projects at: <http://beyondjobs.com/wp-content/uploads/2018/01/C-Possible-interventions-to-support-Irregular-Workers.pdf>

<sup>54</sup> The videos can be watched at: <http://beyondjobs.com/cedah-demonstration-videos/>

<sup>55</sup> This sophisticated underlying database is explained at: Global distribution system: How does travel distribution work - the GDS version

<https://www.youtube.com/watch?v=fJPkS7S-02g>

<sup>56</sup> Subsidize massively: See for example: As Uber spends big to compete with Lyft, profitability in the U.S. is not in sight

Lots Angeles Times

By Tracey Lien

11/9/17

<https://www.latimes.com/business/technology/la-fi-tn-uber-lyft-profit-20171109-story.html>

<sup>57</sup> Risk irrelevance: WORKFORCE TRAINING:

DOL Can Better Share Information on Services for On-Demand, or Gig, Workers

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<sup>58</sup> Open source manual: Making a Market for Irregular Employment: A guide for States Counties and Cities

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<sup>59</sup> <https://www.nytimes.com/2018/08/18/opinion/technology/technology-gig-economy.html>

<sup>60</sup> <https://www.vanityfair.com/news/2018/08/silicon-valley-engineers-fear-they-created-a-monster>

<sup>61</sup> A list of each state's publicly funded platform for any employer and any type of job can be seen at; <https://www.careeronestop.org/JobSearch/FindJobs/state-job-banks.aspx>