

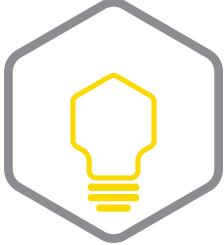
BLOCKCHAIN AND THE CHIEF HUMAN RESOURCES OFFICER

Transforming the HR Function and the Market for Skills, Talent, and Training

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Glass Bead Consulting

January 2018





Realizing the new promise of the digital economy

In 1994, Don Tapscott coined the phrase, “the digital economy,” with his book of that title. It discussed how the Web and the Internet of information would bring important changes in business and society. Today the Internet of value creates profound new possibilities.

In 2017, Don and Alex Tapscott launched the Blockchain Research Institute to help realize the new promise of the digital economy. We research the strategic implications of blockchain technology and produce practical insights to contribute global blockchain knowledge and help our members navigate this revolution.

Our findings, conclusions, and recommendations are initially proprietary to our members and ultimately released to the public in support of our mission. To find out more, please visit www.blockchainresearchinstitute.org.



Blockchain Research Institute, 2018

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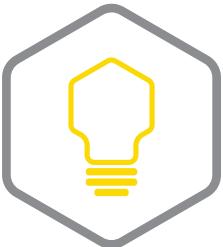
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Foreword

Innovative leaders realize that human resources is an area that, when treated properly, can be a strategic asset, not a cost center. Finding, motivating, and retaining the best employees is more important than ever, and investing in training people is crucial. When I speak to leaders, I often hear the comment (often from chief financial officers), "What if we train our people and they leave?" I respond, "What if we don't and they stay?" Chief human resources officers understand this dilemma well.

Human resources (HR) as a critical function becomes more complicated as firms move towards contingent labor and operate outside traditional organizational boundaries. Many workplaces today are looking more like movie productions, where a disparate group of professionals comes together for a project and then disbands—although many will work together again, in different combinations, on other ventures, with different funders.

This process of assembling and dispersing talent can be far more effective and profitable than the traditional model but comes with the transactional costs of finding the right people, negotiating all their contracts, implementing the terms, and coordinating their contributions. In all these areas, technology can help—LinkedIn's impact on recruiting and Glassdoor's on employer reputation management are two obvious examples.

Blockchain technology will arguably impact the human resources function more profoundly. An immutable distributed ledger can verify a candidate's credentials and work history. The "gig economy" can be more effective for highly skilled workers because they can more seamlessly secure lucrative engagements. For both the worker and the employer, HR platforms running on a blockchain could reduce the search costs as well as the risk, improve productivity, and facilitate faster and cheaper payments.

I am pleased that we partnered with Andy Spence on this project. Andy brings to the Blockchain Research Institute great expertise in the areas of artificial intelligence and cognitive science. He is an innovative practitioner in human resources and organizational transformation.



DON TAPSCOTT

*Co-Founder and Executive Chairman
Blockchain Research Institute*



A persistent HR issue is verifying candidate credentials.

Idea in brief

- » The role of a chief human resources officer (CHRO) is to place the best possible talent, leadership, and capability in positions throughout the organization so that it can achieve the best possible outcome. Procuring top talent in inefficient labor markets and increasing productivity of the organizations' largest cost—its people—are essential challenges of the HR role.
- » A persistent HR issue is verifying candidate credentials. At best, the hiring process weeds out unsuitable candidates. At worst, productivity suffers from poor team performance, reputational damage, and cost of replacement.
- » When a candidate is placed successfully, the ongoing operational tasks of onboarding and retraining, labor contracts, benefits assignment, and payroll management are costly and time consuming.
- » Technological advancements strive to enhance position specification, talent sourcing, and management, but blockchain technology has the potential to disrupt business practices and workflow in the HR space fundamentally. Candidates could share relevant details securely with prospective employers.
- » Information such as qualifications, accomplishments, references and skills could be digitally verified and provide confidence throughout the talent management landscape. A positive match would become a seamless digital contract managed on secure distributed databases.
- » Over time, organizations will be able to find the talent they need when they need it. As the gig economy becomes more transparent, liquid, and beneficial to all stakeholders, organizations will require fewer full-time employees.
- » Blockchain should reduce recruitment costs and give able HR professionals direct access to a pool of top candidates, fundamentally changing the role of HR and creating radically new work organizations.

Introduction

Against the wave of new technologies from cloud and mobile to artificial intelligence and robotic process automation, blockchain has the greatest potential to transform the principles and practices of the human resources (HR) function in organizations.



This function has always been to maximize an organization's productivity through optimizing its employee performance. Chief human resource officers achieve outcomes around talent, leadership, and organizational capabilities.¹ The role has evolved over the years to align with that of the CEO to ensure that the company flourishes.

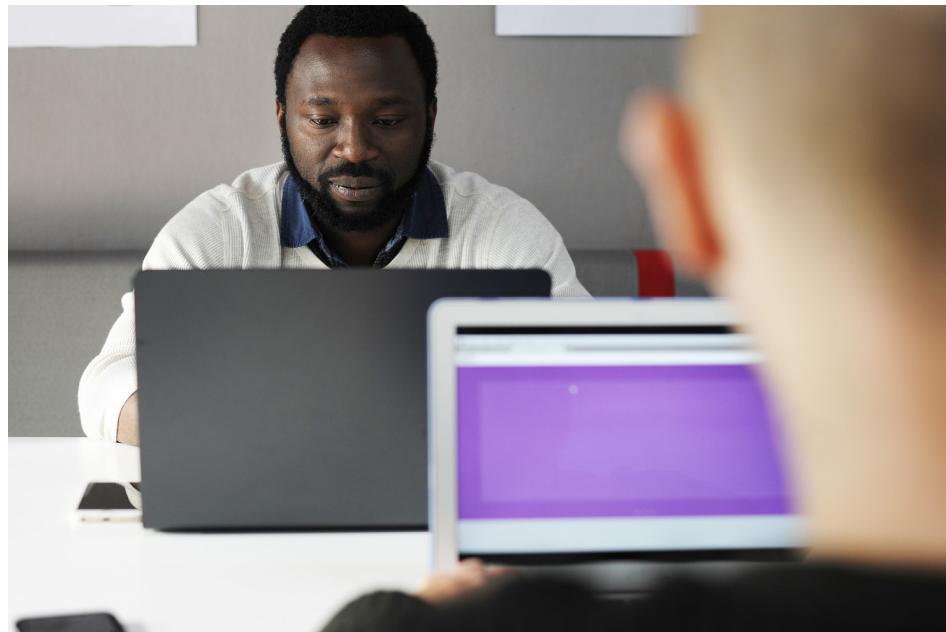
The CHRO of the future is likely to be a change strategist on the board, adjusting the levers that increase productivity and promote the long-term success of the organization. Such employment practices as recruitment, performance management, time and attendance, and payroll emerged in the last century as the global economy transitioned from agriculture to industry.

Blockchain technology has inherent features that can help HR departments to solve current verification and security problems. First, blockchain is decentralized, with no central employee database to hack. Second, while an individual will control access to his or her data, those data are added to the blockchain and verified by such authorities as universities and government agencies and are tamperproof. A hiring organization would be able to spot any attempt to alter those data.

Blockchain also supports *smart contracts*, which translate terms of employment agreements into software code that can be run on a blockchain and facilitate transactions related to hiring, probationary periods, payroll, benefits, performance reviews, and other routine or standard HR obligations.

This research examines the practical application of this emerging and promising technology in the HR function and the sourcing, development, and management of talent.

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Brainstorming business with colleagues by rawpixel, 2017, used under CC0 1.0.



Challenges for the 21st century CHRO

In 1937, Ronald Coase identified three types of transaction costs in an economy relevant to HR professionals:

- » *Search costs:* The cost of finding the right talent to produce something
- » *Coordination costs:* The cost of getting these people to collaborate efficiently
- » *Contracting costs:* The costs of negotiating labor for every stage of production

Coase speculated that an organization would expand until the cost of performing a transaction internally surpassed that of performing it in the open market.²

The Internet propelled a shift in the economy, from one of atoms to one of bits, requiring new skills and talent, including the instant sharing (rather than hoarding) of ideas and information. Organizations required new communicating and collaborating skills and a higher degree of responsiveness across many industries. Pioneers of this technology had high hopes for a friction-free economy and the emergence of the networked enterprise that would displace corporate hierarchies and catalyze growth.

Over time, the Internet has reduced the cost of these transactions, particularly when searching for workers. Search engines give more visibility to job postings and opportunities to poach valuable workers from competitors. Recruiters can scour electronic job-boards, LinkedIn, Facebook, and other social media networks for candidates and scrutinize prospects' personal posts. HR departments are even automating recruiting tasks, now that robots and pattern recognition engines can identify qualified individuals, ask screening questions, and create reports for hiring managers.

Webinars, livestreaming conferences, open universities, and learning management systems have enabled organizations to tap into and train a global talent pool. Communication costs have fallen to minimize physical travel; Skype and FaceTime have enabled virtual meetings.

Coordination costs have also dropped with the use of e-mail, smartphones, and such collaboration tools as team wikis, Cisco Quad, Workplace by Facebook, Google's G Suite, IBM Connections, Jive, Microsoft Yammer, Salesforce Chatter, and Slack.

HR staff has excelled in leveraging cloud-based HR systems and outsourcing recruitment, benefits, and payroll; but the fundamental economic principles remained unchanged.

HR staff has excelled in leveraging cloud-based HR systems (e.g., Workday, SuccessFactors, and Cornerstone) and outsourcing recruitment, benefits, and payroll; but the fundamental economic principles remained unchanged.



At the same time, the Internet presented an array of security and functional challenges (Figure 1). We still have issues around verification of identity and experience—not just whether the candidate is who she claims to be but also whether she has the skills and experience listed on her résumé at the level needed? Many HR departments still rely on the humble résumé, and some do criminal and financial background checks.

Security and confidentiality are also concerns. In light of the hacks of US Office of Personnel Management (21.5m records) and the UK Ministry of Finance (1.7m records) to name two, can we absolutely guarantee that our employee and contractor data are safe?³ Both of these areas can damage customer relations and employee trust fundamental to organizational success.

Contracting between a worker and a company has not changed that much from the predigital age and takes nearly as much time as it did in the 1980s.

Blockchain, with its ability to attest to credentials and confirm identity without compromising privacy, could address these and other challenges. It also holds potential for bringing labor contracting into the digital age through smart contracts.

There may be an abundance of qualified workers in the global workforce, yet organizations still struggle with a talent supply problem, known as the “talent management paradox.”

The search for talent in problematic labor markets

There may be an abundance of qualified workers in the global workforce, yet organizations still struggle with a talent supply problem, known as the “talent management paradox.” The global staffing industry is estimated to have generated \$428 billion sales in 2016.⁴ In a survey of US companies, 46 percent were having

Figure 1: CHRO challenges

Search for talent in problematic labor markets

Improving workforce productivity

Threats to customer and employer brand and reputation

Managing organizational change to remain competitive



difficulty finding people with the right skills.⁵ The cost of labor is inflated because of high recruiting costs (nearly \$4,000 on average to fill an open US-based position).⁶ The process itself suffers from poor transparency, unreliable candidate verification, and supply-and-demand inefficiencies. In addition, about a quarter of Americans change jobs every year according to Labor Statistics, which equates to more than 41 million people searching for jobs in a year in the United States alone.⁷

Although some HR teams use people analytics to predict which factors lead to more successful hires; most are not capturing the required data or do not have the relevant skills and techniques.⁸

The CHRO is responsible for solutions to identify future sources of talent supply. Employers adapting to globalization, low productivity, wage pressure, and talent shortages are not investing in people as they once did (Figure 2). Many organizations are moving away from the traditional role of builders of talent to that of consumers of work. Many employers must choose between hiring skilled staff and developing the specialized skills needed for their business.

Increasingly, HR and organization managers have reframed key objectives from "I need to hire someone" to "I need this job done." Other questions follow, from "Can I automate or outsource this task or set of tasks?" to "What type of worker do I need?" "What level of experience do I need?" A trend in the market is the emergence of the "gig economy" that is no longer confined to service industries. An estimated 540 million people could be working as freelancers via online talent platforms globally by 2025.⁹ Gig workers make up 35 percent of today's approximately 158 million-person US workforce, including nonemployee workers, temporaries, freelancers, *statement-of-work* labor, and independent contractors.¹⁰ Employment networks are disrupting the labor market.

Although some HR teams use people analytics to predict which factors lead to more successful hires; most are not capturing the required data or do not have the relevant skills and techniques.

Figure 2: Problematic labor markets



Online employment platforms (as of Jan. 2018)

LinkedIn: 500 million members, acquired by Microsoft for \$26.2 billion in 2016

Upwork: 14 million freelancers

PeoplePerHour: 1.1 million hourly jobs posted

Google for Jobs: The powerful search engine making sense of job listings

Monster: One of the earliest job-boards, acquired by Randstad for \$429 million

Indeed: The highest traffic website for job listings with over 200 million unique visitors every month

Topcoder: Crowdsourcing, with a million technology projects

Tongal: The online platform with 125,000 creatives for video production

Mechanical Turk: Owned by Amazon, it enables users to get tasks done or earn money for human intelligence tasks (HITs)

Glassdoor: 33 million workers have given “feedback” to their employer

An estimated 20 percent to 50 percent of job applicants embellish or outright lie about their credentials.

From the worker’s perspective, beyond the obvious interest in rate of pay, there is a demand for diversity and flexibility of roles. A contract should be an agreement between equals, yet most workers agree to employment contracts without any negotiation. Often, staffing or temporary agencies undercut direct relationships between workers and employers. Organizations may pay lip service to employee engagement, measurements, and initiatives, but the reality is that many workers find little meaning in their work. A YouGov survey in the United Kingdom found 37 percent of workers think their jobs are meaningless.¹¹

On the demand side of recruitment, the art of segmentation and description of jobs is in disarray, and Google has been building a job taxonomy that aggregates similar job titles into “families” of jobs that are searchable and organized by discipline.¹² On the supply side, we see very little standardization for describing and ranking candidates. The lack of a usable data structure makes the matching process extremely inefficient.

An estimated 20 percent to 50 percent of job applicants embellish or outright lie about their credentials.¹³ This fraud frequency contributes to costs incurred on the background verification process, increased cost of replacement, and even the possibility of security breaches.

In a competitive talent market, the slow down caused by the vetting procedures of documentation and verification can also frustrate the candidate, hamper smooth onboarding, and delay transition into a



Trust is the ultimate currency, and the protection of confidential customer and employee data is the touchstone of all organizations.

Failures in data security can decimate a brand that has been carefully cultivated for years within a matter of days or even hours.

new role. In addition to the challenge of finding valuable, available, and verifiable candidates, there is also the problem of hidden bias and discrimination on the part of a recruiter.

The CHRO has to come up with solutions on where to build, borrow, or buy the future talent supply. This process is dramatically different than it was even in the last decade. "Our talent innovation used to happen at the boundaries of the firm, but increasingly can be crowdsourced externally," wrote Don and Alex Tapscott.¹⁴

Threats to customer and employer brand and reputation

The CHRO is responsible for managing risks that directly affect the customer brand, engagement, and reputation. With attention to their branding, organizations can differentiate themselves in the labor market and enhance their program's success in recruiting, retaining, and engaging the right people. Powerful brands spring from the mass collation and analysis of customer and employee data to anticipate market needs. Trust is the ultimate currency, and the protection of confidential customer and employee data is the touchstone of all organizations. Failures in data security can decimate a brand that has been carefully cultivated for years within a matter of days or even hours.

Consider these major data breaches that have damaged the customer and employer brand and confidence in the HR function:

- » The security breach of credit-reporting agency Equifax exposed the personal information of 143 million US-based users.¹⁵ The event raised issues about the nature of credit checking as part of the background verification of candidates as well as the security of 401(k) accounts.
- » UK retailer Sports Direct reported a data breach to the authorities but not to staff, whose personal bank details may have been compromised.¹⁶
- » Uber has suffered damage to its brand at the hands of its management and HR staff.¹⁷
- » A man spent a decade pretending to be a doctor by faking his medical qualifications.¹⁸
- » In 2014, Sony suffered a major cyberattack in which hackers obtained 100 terabytes of data from Sony servers, including internal e-mails and confidential data about employees and their families.¹⁹

Managing risks in people management requires a long-term and sustainable strategy that includes maintenance and analytics of employee data and personal information, compliance with regulatory bodies, and executing flawless hiring decisions.



Improving workforce productivity

Employee costs can represent as much as 70 percent of the total expenditure of an organization, and a CHRO is expected to strive continually for greater workforce efficiency and effectiveness.²⁰ The difference in value and output from hiring an average software engineer or designer to a brilliant one can have a massive impact on revenue and productivity.

The CHRO responsibilities are divided among recruiting activities for appropriate talent, managing the contractual elements of employees, contractors, and suppliers, and managing human resources to deliver maximum output to productive teams. Any solutions that promise to reduce the cost (and bureaucracy) of contracting and coordination could be attractive to the CHRO.

Managing organizational change to remain competitive

In a survey of 10,400 business and HR leaders in 140 countries, the most important priority for CHROs was "The Organization of the Future."²¹ We need a new model, one that verifies skills that our organizations actually need, with fair and efficient payments to workers.

To remain competitive, we need an effective means to secure talent and reduce transaction costs as well as demonstrate market transparency. It should enable us to monitor workflows, implement regulatory updates, and support a high performance culture. The existing tools and systems may not be sufficient for these 21st century needs.

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HR revolution in three waves

Imagine breaking down all the existing data silos within the firm. That would be just the beginning of the disruption. All employee details—payroll, expenses, work performance, employment history, insurance, psychometrics results, and security—could be accessed in one *verified career profile*. The contracting process would be instantaneous, employees could begin work immediately, and payment would flow automatically and at favorable intervals.

Recruiters who traditionally managed the relationship between employer and candidate could become obsolete. Over time, organizations might need fewer full-time employees as contractors secure gig-work using smart digital contracts and payment mechanisms; and large organizations might be able to redeploy in-house talent more efficiently across projects and business units. The potential blockchain solutions could solve many CHRO challenges



The first wave of blockchain would begin to resolve some of the fundamental issues with recruitment: identity management and verification of credentials.

(including assessing talent quality, people risk management, and improving productivity). Those seeking skilled and talented workers would have greater trust in the labor market that could lead to more efficient talent exchanges and set in motion a fundamental transformation of the nature of work (Figure 3).

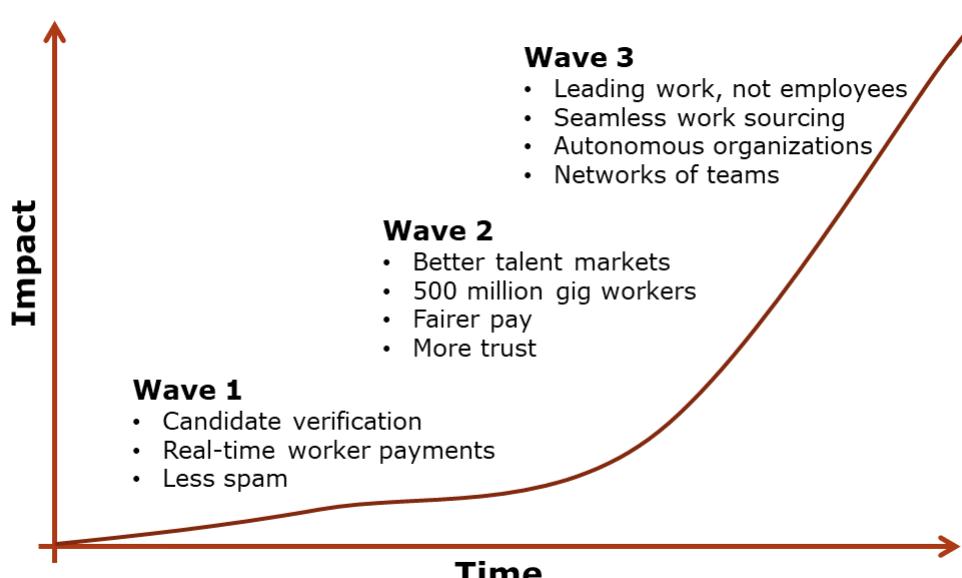
The first wave of solutions in HR could start with blockchain-based career social networks and work platforms that provide verification of candidate identity and credentials, real-time payments for time-based workers, and agreed digital standards in employee profiles. In the medium-term, such systems could reduce the cost of transactions as we buy and sell many types of skills in open exchanges, all of which could lead to fairer remuneration for workers.

Eventually the firm itself would realize these major impacts on HR, with smaller management teams at least partially comprised of contractors. Current HR activities would no longer include affirming worker experience, allocating rewards, providing performance reviews, awarding bonuses, conducting pay research, succession planning, creating training and development (T&D) programs, and contract administration. The focus for HR would shift instead to behavioral science; decomposition of work into discrete tasks; coding, testing, and deployment of smart work contracts; and talent portfolio management in parallel with innovation, research and development, and intellectual property portfolios.

The first wave of blockchain in HR

The first wave of blockchain would begin to resolve some of the fundamental issues with recruitment: identity management and verification of credentials. Payment processes could change

Figure 3: Impact of three waves of blockchain work solutions



dramatically with some groups of workers receiving payment in nearly real time for outputs, physical presence, or time worked.

Identity management in the digital age

In Dave Eggers' dystopian novel, *The Circle*, protagonist Mae Holland receives a job offer from the Circle, a company that links users' personal e-mails, social media, banking, and buying with its universal operating system, "resulting in one online identity and a new age of civility and transparency."²² Eggers explained how the company uses these data to achieve world domination. *The Circle* raises chilling questions of privacy, democracy, and even free will. As we work to resolve identity issues, we could face similar questions.

In recruitment, the Internet has brought many positive developments, but many practices simply mirror an age when our processes were paper-based. Google has transformed how we search and find information, and it has focused some of its attention on hiring. Google for Jobs launched in June 2017. Its taxonomies for jobs and vacancies could help the talent ecosystem and matching process.²³ The other side of the equation is résumés. Recruiter technologists have found ways to scrape relevant information from résumés in Microsoft Word or portable document format (PDF), but the process is messy and full of inaccuracies that prevent effective matching between positions and qualified workers. An accepted standard would benefit both employers and applicants.

By owning and managing their own secure digital identity, individuals could have full control over their data, allowing them to prevent misrepresentation and creating trust among candidates, agencies, talent platforms, and employers. Job candidates could be confident that the information supplied was correct; and employers could verify that candidates were who they said they were.

A decade ago, some thought that LinkedIn was the dawn of a new era and would disrupt large segments of the hiring business. Business cards and personal résumés would surely disappear as we could manage our professional network online. Initially, LinkedIn struggled to find a sustainable business model; and, rather than disrupt the hiring business, it found a way to serve it instead. At last, HR had its own social media darling: it made recruiters' and headhunters' jobs much easier, professional members found it useful, and it was free.

Even before Microsoft bought LinkedIn for \$26.2 billion in 2016, the business model required user-generated data to be stored on centralized servers and monetized. For example, of its \$3 billion annual revenues, \$530 million come from subscriptions that allow recruiters and sales people to send direct messages to potential candidates or customers. So, although some careers have benefitted from this social media model, it has several issues:

- » *Subscription has meant permission.* The subscription service model has allowed recruiters and other business development



teams to do unsolicited e-mails, spam, in-mails, and cold calls. After a few years, this intrusiveness has destroyed users' trust in the recruitment industry; and many potential candidates no longer use the platform.

- » *Profiles are not verified.* "Studied at Harvard" can mean studied *Harvard Business Review*. Friends, friendly suppliers, colleagues, and even family members can recommend each other. There are very few consequences of having an inaccurate or misleading profile.
- » *Users do not own their data on LinkedIn, Microsoft does.* This includes a user's work history, which posts the user likes, the user's point of view, reading lists, and professional network. These data are sold to the recruiting industry. This model is not unique; we make this type of deal for the free services provided by Facebook and Google, for example. An ongoing court case could decide whether LinkedIn data can be used for commercial purposes.²⁴
- » *The fees can be excessive.* When, on behalf of a corporate client, a recruiter does a search using LinkedIn to present a candidate on a short-list, set up an interview, and maybe make an offer, the recruiter receives around 20 percent of annual salary as a fee. A common view from paying employers is this fee is no longer justified.

How do we address these issues?

The root cause of many of these problems is centralization. Over time, users will not be willing to use the platform, its utility drops, and the efficacy of this business model fades.

Digital identities are not just a problem in careers and hiring. We all have many identities on different centralized platforms, apps, and networks all inconsistently and imperfectly presenting who we are. Decentralized blockchain technology provides an opportunity to develop commercial products for anchoring official records. There are different approaches to do this. For example:

- » uPort is an open source wallet that can issue credentials to recipients.²⁵
- » Blockstack allows people to own their data, starting with their domain names.²⁶
- » Brave has developed an Internet browser that blocks all advertisements but allows individuals to opt into receiving payments from advertisers in exchange for sharing some of their browsing data and viewing ads.²⁷

How can this help the careers and hiring market?

In short, the solution is to create decentralized networks where individuals own their own career data, can choose whom to share it with, and can monetize their own data fairly.



For example, Earn.com turns the centralized social network on its head. It is a positive-sum social network, where every notification is an opportunity for users to earn money, not a distraction or downright negative. In the context of hiring, after a user's profile is online, interested parties can ask to speak to the user for an agreed fee.²⁸

Verification of candidate credentials using blockchain

A key challenge for recruiters is ensuring candidates are who they say they are and have verifiable qualifications.

A key challenge for recruiters is ensuring candidates are who they say they are and have verifiable qualifications. For the hiring manager and ultimately the CHRO, a distributed ledger could assure the authenticity of the credentials provided by a candidate or by firms performing background checks. The first wave of blockchain use in HR could provide a secure ledger of candidates' identity, credentials, and qualifications.

Workers could remain in control of all their personal information and transactions and confidential information is protected on a verified career profile (Figure 4), held on a decentralized social media network. Further attributes such as security access, insurance details, payroll, expenses, work performance, employment history, or psychometrics could also be added to this profile. Individuals can choose how others may use their profile and whether to monetize this usage through tokens.

Figure 5 (next page) shows how we could use blockchain technology on a career platform to verify a claim from a worker's career profile such as a university degree. A career claim could include diplomas, certificates, work experience, publications, references, or assessments.

Figure 4: Verified career profile on blockchain

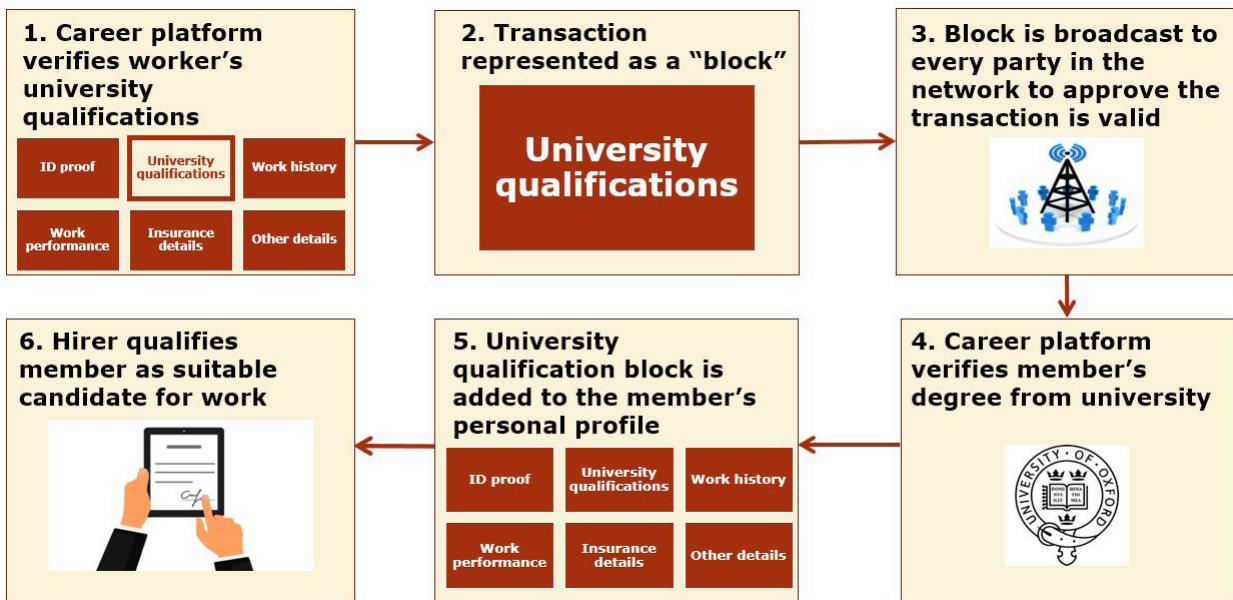
Hash coded certificates and user key authentication to ensure privacy.



The worker need not provide the original document because the proof of validation constitutes a proof of authenticity of the credential.

1. Using official identity documents and biometric verification, a “worker” or “talent” sets up an identity on a blockchain-based career platform. The worker can make a request to an authority (e.g., university) to validate a previously issued credential (e.g., college degree) on the platform.
2. The decentralized application automatically contacts the relevant issuer.
3. The university (a) stores such data as the name of the worker, the university’s name, the date of issue, and the degree earned in a digital file (“the credential”), (b) signs the file cryptographically with the university’s private encryption key, (c) creates a cryptographic hash of the file—which is a sort of digital fingerprint used to verify that the file has not been altered—and (d) stores the hash on the career platform via a transaction, which is broadcast to every party in the network for validation.
4. The career platform can then produce on demand an indisputable proof of notarized validation duly stored in the blockchain and generate a unique hash key, which is encrypted.
5. The worker need not provide the original document because the proof of validation constitutes a proof of authenticity of the credential.
6. The hirer is satisfied that the worker is a suitable candidate for work. For new employee onboarding, the platform will provide a digital feed of the employee’s credentials to the HR information system using an application program interface (API).

Figure 5: Verification of a worker’s university degree using blockchain



Efficient verification of candidate credentials could eliminate the cost of third-party background checks and allow for faster, more effective onboarding of new hires.

In terms of incentives, the issuer (here, the university) receives tokens for validating and storing the credential on the platform. When the transaction is complete, the worker will pay a service fee via tokens transmitted automatically through a smart contract.

Distributed ledger technology (DLT) is used to store proof of validation in the form of hash outcome or digital fingerprint in the blockchain, which acts like a digital safe. The encrypted fingerprint can then be referenced at any time to prove validation: as long as the hash of the credential file associated with the worker's identity matches the hash on the career platform, then the document has not been altered since validation and is therefore authentic. This ability will be most useful in industries with highly regulated credentials verification requirements (e.g., aviation or medical).

Over time, when the network has matured, each worker will have a unique network of contacts, jobs, and employers, contributing to a unique digital identity very difficult to impersonate or replicate exactly. It could become a core source of identification proof. Decentralized identification technologies such as Blockstack, uPort, Civic, and Ethereum rely on various methods to authenticate self-sovereign managed claims.

Efficient verification of candidate credentials could eliminate the cost of third-party background checks and allow for faster, more effective onboarding of new hires. Authenticated candidates could agree to a smart employment contract, and the contract attributes could be linked through APIs to the employers' data held on HR information systems. It could also alleviate candidate frustration and attrition risk associated with a lengthy or laborious vetting process.

Building a decentralized careers social network using blockchain

Once individuals have been identified and their qualifications verified, they can decide to share these data on a social network or make them available to an employer search. A number of models might develop. One is similar to Earn.com, where individuals receive incentives (e.g., tokens or cryptocurrency) to respond to those interested in interviewing or hiring them. This approach alleviates the current spam problem. Another is where individuals can apply for known vacancies using their pre-verified profile and references.

For career social networks and work platforms to function effectively and match job openings with best-fit candidates at scale, they will need to have the following design features:

- » *Trustworthiness.* Allowing individuals to own and manage their own verifiable identity, qualifications, and work history can strengthen their confidence in fairness in the hiring process. Employers can have the security that workers are who they say they are and have the requisite skills and qualifications to do the work without knowing their gender, age, ethnicity, or any other dimension of bias.



Overall, the transactions cost of human resources should drop and enable employers to pay higher rates to workers in competitive labor markets.

- » *Digital identity verification mechanisms are decentralized.* Blockchain is a distributed ledger; there is no central database, and so information is more secure. Any attempt to tamper with a digital identity or the data associated with it—qualifications, work history, health, and safety certifications—would be visible to the whole network. This immutability should improve trust.
- » *More secure and quicker payments to workers.* Smart contracts enable escrow accounts and community-led dispute resolution mechanisms between clients and workers. Smart contracts can reduce the reliance of payday loans that some ten million US workers use at very high interest rates to bolster household cash flow.²⁹ Blockchain currency mechanisms can also reduce the worker cost of overseas remittances to family members.
- » *Lower transaction costs.* Using a distributed ledger as a career platform could reduce the typical fees (~15–35% of contract value) paid to recruiting intermediaries. Use of the platform may involve transaction fees, but they could be below five percent and potentially offset by incentives to engage with content or other entities. The case for usage will be stronger if the networks become worker-owned. Overall, the transactions cost of human resources should drop and enable employers to pay higher rates to workers in competitive labor markets.
- » *Network effects.* The business models depend on common ownership and incentives to participate. Freelancers (and hiring firms) could own the platform by purchasing tokens representing shares. For the model to succeed and ultimately replace current centralized networks, it would need enough participants to match supply and demand. The more individuals participate, the more valuable the platform becomes. Until enough workers and hiring parties join, others will have insufficient motivation to participate. Start-ups should expect tough competition from the main industry incumbents, Indeed, LinkedIn, and the job boards.
- » *Incentives.* In these models, parties use tokens to reward different behaviors or results: agents receive tokens for setting up interviews; workers receive tokens for accepting a hiring party's call or providing references. These tokens can also provide access to the community. If the platform benefits from network effects, then these tokens could have intrinsic value in the long term.
- » *Worker-owned networks.* Publicly listed technology companies own current centralized platforms. To attract members and workers, the creators of a social network could provide new members with tokens as equity in the network and/or voting rights over how the platform operates. Such incentives will not only attract participation but also allow community based interventions such as dispute resolution.



- » *Digital work audit trail.* The ability to audit continuously—after all, transactions on a public blockchain happen in plain sight—will give users more confidence in the system and prevent exploitative practices such as forced or compulsory labor. If we can trace the supply chain of pork from farm to supermarket, then surely we can track the work paths of people.

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Construction worker safety by bridgesward, 2017, used under CC0 1.0.

How blockchain could expedite hiring and paying time-based workers

One big opportunity is improving the payment process for different types of workers, from permanent, to contractors, to those offshore.

For individuals, particularly offshore workers whose pay comes via wire transfer, as much as 10 percent of salary income can be lost to third parties. A blockchain-enabled system utilizing borderless cryptocurrencies would allow the transfer of funds nearly instantaneously without a high fee or third-party facilitation.

Sending payroll data electronically overseas is expensive for businesses and can take time to process through multiple intermediary banks. Blockchain could play a significant role by reducing costs for distinct groups of employees. Sergei Sergienko, CEO of ChronoBank, said, “Our goal is to make a difference in the way people find work and get rewarded for their labor, doing it decentralized and without the involvement of traditional financial institutions.”³⁰



Three companies using blockchain to pay contractors

ChronoBank: A blockchain-based financial system for freelancers

ChronoBank.io (chronobank.io) is an Australian company providing a short-term work platform using a blockchain-based financial system whereby work is obtained and paid for using a “labor-hour” bitcoin-style token. Over time, it plans a LaborX decentralized marketplace where people in real-world professions can sell “labor-hours” to anyone where the market sets the prices.³¹

Bitwage: Reducing cost of paying international employees to one percent

Bitwage (www.bitwage.com) is taking the potential of cryptocurrency in the international payments space and applying it in payroll. Its combination of blockchain, mobile, and cloud technologies can reduce the cost of paying international employees to just one percent and yield same-day direct payouts for employees.³²

Etch: A real-time payment system based on Ethereum blockchain

In the United Kingdom, Etch (etch.work) has piloted a program to pay construction workers based on their physical presence working on a job site. It makes payments in real time on the Ethereum blockchain, an immutable distributed ledger. Workers and employers can easily audit each transaction, since transactions are public. Etch can make payments through an app or using tokens.³³

It's early days, with many going live in 2018. Many start-ups are in the initial stages of *initial coin offering* (ICO) to fund these new businesses with their own tokens. The freelancer market is huge, and so the early leaders will take an early slice of the market in their industry niches. We will then see industry consolidation as the existing players react slowly to what is going on.

The second wave of blockchain in HR

The second wave of blockchain could provide benefits in the broader talent ecosystem and the related impact of having a bigger, stronger, fairer gig economy while reducing the number of full-time employment contracts.

How blockchain can improve talent search and increase productivity

The features of blockchain technology enable it to perform where there is organizational “friction.” Recruitment itself has many friction points, from sourcing viable candidates to background checks and psychometric testing. Career profiles controlled by individuals could be held on a blockchain, and be verified by external authorities, facilitating a more efficient market.



The distributed nature of blockchain and its ability to match talent networks to employment opportunities could open up a broad range of new talent sources, creating new opportunities to increase diversity of hires by geography, skills, and cognition, and virtually eliminating the recruiter role for most positions. What's more, by relying on readily verifiable credentials, the process virtually eliminates conscious or unconscious bias and discrimination, another point of friction.

Over time, the use of blockchain technology could eliminate transaction friction around onboarding. Payment, reference checking, visa checking, insurance checking, building access, security clearance, IT access could all be attributes added to a personal career profile. In terms of productivity, blockchain is associated with a reduction in the cost of verifying transaction attributes—in this case, elements of hiring.³⁴ For this market to function, key attributes of the individuals and the firms involved would need to be verified and audited before and after a transaction takes place.

Participating in a marketplace through the blockchain rather than traditional intermediaries—recruitment agencies—could reduce the cost of networking.³⁵ Whereas this process is often labor-intensive or requires a third party to ensure market safety, we could implement it on a distributed ledger at significantly lower cost.

By relying on readily verifiable credentials, the process virtually eliminates conscious or unconscious bias and discrimination, another point of friction.

Imagining Blockwork: A blockchain-enabled Upwork

Upwork, an existing disrupter in the gig economy formerly known as Elance-oDesk, currently has 14 million registered freelancers and five million registered clients. Three million jobs are posted annually, worth a total of \$1 billion, making it the world's largest freelancer marketplace.³⁶

In the Upwork model, someone with a work project posts the job on the platform and reviews the pitches and fees from freelancers around the world. Freelancers such as web developers, designers, writers, or accountants who subscribe to the platform are rated—as travel destinations are rated on TripAdvisor—and so employers have a pretty good idea of the reputation of the workers. The hiring person can review profiles of freelancers, interview short-listed candidates, and then offer a contract. Once the freelancer has completed work to the employer's satisfaction, payment goes through the Upwork platform; Upwork takes a 10 percent fee, plus a 2.75 percent fee to a financial intermediary (e.g., Mastercard or PayPal). Upwork also charges the freelancers fees from five to 20 percent of total contract fees.

There are pros and cons to this model for all parties. Employers with a specific project can tap into a global marketplace and compare skills, feedback, and fees. This platform may be ideal for a discrete, low risk project. Complex projects involving access to data and customer information present a higher risk. The model works well for freelancers with positive project reviews located in areas with a low cost



of living. However, critics argue that platforms like Upwork fuel a “race to the bottom”: those willing to work for the lowest fees will get the jobs, bringing down the average wages paid for projects across the board.

There is a limit to the scale and complexity of the projects undertaken for many reasons, the most important of which is trust. Many projects undertaken are between people who will never actually meet in person.

What if we implemented the best aspects of the Upwork model on a blockchain and called it Blockwork? We could crowdfund the development and launch of Blockwork by issuing our own cryptotoken on the Ethereum blockchain. Each token holder would be, in effect, a shareholder in our new platform. Freelancers and employers could both hold stakes in our new venture.

Our Blockwork would provide a similar matching platform with freelancers pitching for projects, but ours would use smart contract technology. Freelancers would receive payment almost immediately in cryptotokens and avoid the usurious fees paid to intermediaries. Credentials for identity and project performance would be verified on a block. An employer with a project would also have verified credentials for identity and payment performance for projects.

When the specifications of a job matched the qualifications and financial requirements of a freelancer, the parties would agree on terms and form a smart contract specifying the conditions for the work, including the checkpoints, deadlines, and fees to be paid. When the freelancer has successfully met the conditions, the client would create a hash on the blockchain, thereby authorizing automatic payment in a cryptocurrency.

Although the freelancer and the client would both be utilizing the blockchain platform, they would effectively contract directly with each other. They would pay a nominal fee to the platform as a percentage of contract value. Since both freelancers and job posters could hold stakes in the platform, they would have incentive to build and maintain a large, robust network. By cutting the fees (estimated at 18-38% of contract value), freelancers would realize higher pay rates and receive payment almost immediately via tokens. Because the capabilities of the workers would be more robust, the projects would require less time and could save the job posters costs.

Because credentials of freelancers could be reliably validated, hiring firms could post more complex, valuable projects to the platform. The skills procured could gradually move up the skills and talent value chain. In the market for business advice, if competent teams of freelancers could form to solve complex business problems, they could disrupt the consulting industry.³⁷

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Blockwork could support the growing trend in certain markets for full-time employees to choose shorter-term work contracts. One benefit of blockchain comes from cutting out fees to brokers, creating a new ownership model, and incentivizing the network to grow the platform. Organizations would need to learn to manage a Blockwork model as an important part of their talent ecosystem, not as a supply chain to obtain the cheapest cost per output.

There could be variations of Blockwork operating in different geographies and industry sectors for specific types of projects. There could also be various ownership models—from network owned, to shareholders, and even public bodies.

Our Blockwork would likely have a rocky trajectory as rules of the market adjust and successful platforms gain market share. However, the principle behind Blockwork could solve some of the more persistent problems in the labor market.

In a flexible labor market with ever-higher turnover of projects and jobs, it could be even more important to attract the best workers to an organization.



Brainstorming business by rawpixel, 2017, used under CCO 1.0.

Reducing risk and enhancing employer brand and reputation

Blockchain can reduce risks to brand, reputation, relationships, and assets. This is especially valuable for positions of significant influence working with vulnerable people or where staff requires external certification in industries such as food service, transportation, and health.

As organizations evolve, there could still be core employees, contractors, and gig workers, and the need for an attractive employer brand could be increasingly important as greater visibility informs workers of all levels of what it is like to work for a particular organization. In a flexible labor market with ever-higher turnover of projects and jobs, it could be even more important to attract the best workers to an organization.



A potential benefit in terms of risk management, especially for government authorities, could be tackling exploitation at work. Having an audit trail of verified workers could help to ensure that employers and workers are protected from encroachment in the system by those compromised under forced or compulsory labor and expedite the work of such bodies as the UK Gangmasters and Labor Abuse Authority (GLAA).

Payroll, employee benefits, insurance, and pensions

Workers around the world are paid in a wide range of pay periods. For example, 36.5 percent of US private businesses pay their employees every two weeks, the most common pay period. Paying employees is big business. The global outsourced payroll industry was worth \$16 billion in 2016.³⁸ For employers, payroll has no big upside. With 100 percent timeliness and accuracy expected, there is only downside. Administration costs vary, but the global average cost to employers is \$194 per employee per year.³⁹

For employees, a payroll mistake can cause serious cash flow problems for themselves and their dependents. The timing of payment can range up to eight weeks for some employees. For a variety of reasons, many workers receive payment late, leading to financial instability and expensive payday loans. The largest global payroll outsourcer makes three percent of its revenues from interest earned on funds held for clients.⁴⁰ Paying employees and contractors in tokens and cryptocurrency could have a number benefits. Employees would be paid immediately for their work, and employers would reduce the administrative cost of payroll.

Blockchain systems could efficiently track employee benefits, pensions, and insurance in different blocks, providing added protection for individuals and employers over legacy systems. Parties would use smart contracts to make changes to benefits or pension plans.

A distributed workforce enabled by blockchain could reduce the need for permanent contracted employees and associated employee benefits packages. We would need to reimagine benefits packages for people on short-term work contracts. Citizens of countries without strong social safety nets—those without provisions for universal healthcare, retirement, or job retraining, for example—should question how to manage fairly the benefits, health insurance, and pensions of freelancers in their jurisdictions.

Professional skills development and learning

One major impact that blockchain could have on HR is the ability to record earned credentials—including educational and training qualifications—using smart contracts. The number of students around the globe enrolled in higher education is forecast to be 262 million by 2025.⁴¹ Nearly 1.1 million vocational certificates were awarded in the United Kingdom in fourth quarter of 2016.⁴²

A distributed workforce enabled by blockchain could reduce the need for permanent contracted employees and associated employee benefits packages.



The use of blockchain to record and verify earned degrees, training, professional development, and other credentials, could protect the value of official accreditation through educational establishments and *mass online open courses* (MOOCs). Allowing university degrees to be verified using blockchain could make degree records more secure and cut administrative costs and save time and money for companies doing candidate background checks.⁴³ Recent research indicated that 25 percent of résumés contain lies about degrees.⁴⁴

Organizations might be less willing to invest in their own formal corporate training programs and expect to hire workers with particular verifiable qualifications for a specific function. Another benefit of a workforce of individual contractors and projects is the ability to access skills on demand. Depending on how the economy develops, individuals may choose the course of action that can be verified using a smart contract and added to a personal career profile.

The market for providing qualifications and teaching skills would have to continue to grow at an exponential rate and to higher standards. Having a verifiable audit trail of candidates and employees certification (e.g., health and safety) could make compliance activities easier when liaising with regulatory agencies.

In academia, accreditation could be possible for a student, directly verified by a teacher or lecturer, and added to a personal career profile. Blockchain cuts out the intermediary—which in this case might be the college or university. This raises questions on the future role of universities and other educational establishments, which might look increasingly like non-value-adding intermediaries.

How blockchain could support managing organizational change

Blockchain cuts out intermediaries that add no value. Will the university (or other educational institution) still have a role as an intermediary between professors and students?

Blockchain could provide authentic talent networks as an open exchange between employer and employee. Recruitment could become almost seamless, “A simple boundary change, because you already know who they are and who you want,” as Don Tapscott said.⁴⁵

When blockchain talent platforms reach this level of maturity, realizing the benefits in cost and productivity could require a complete overhaul of organizational structures. As more employment transactions are added to the blockchain, accurate predictive analytics of current and future skills could be possible, providing the CHRO with greater visibility of talent and mechanisms for managing productivity. Faster response to mergers and acquisitions with precise employee information and analytics, swift mobilization of teams, redeployment of staff for emergencies and opportunities are just a few possibilities.

After the first two waves of blockchain solutions we could see the boundaries of the firm shift—the catalyst to a more confident,



equitable and effective labor market. For the CHRO, the costs of search, coordination, and contracting could continue to be reduced by the introduction of blockchain-enabled talent systems. Searching for the right worker to fulfill the needs of the organization could become more efficient. We could have much higher staff turnover, as matching demand to the talent supply is refined and cost of recruitment and background checking declines providing significant savings.

Contracting between procurers and providers of work could become almost frictionless as agreements could be made quickly with smart contracts. The transparent nature of the attributes and rules that govern smart digital contracts should result in fewer disputes. HR could use smart contracts to lower the costs of building relationships with external resources and re-allocate investment into higher-value activities such as refining predictive team performance models.

Coordinating teams to deliver the organizational goals is unlikely to be automated fully. However, having visibility of the composition of a team and its attributes could make it much easier. By optimizing the searching, contracting, and coordination of work, blockchain systems could lead to a vastly reduced central core team. This would probably happen in stages with candidate verification leading to better talent networks and frictionless recruitment as in the first wave.

At its core, blockchain is a peer-to-peer technology, allowing us to transact without the need for centralized intermediaries.

The third wave: Changes to the firm and HR

At its core, blockchain is a peer-to-peer technology, allowing us to transact without the need for centralized intermediaries. This vision will enable greater efficiency around work-related transactions (i.e., search, coordination, negotiation, contract execution) without intermediaries such as bankers, recruiters, talent agents, and background checkers. Our personal work profiles will have ratings



Architect office meeting by 889520, 2017, used under CC0 1.0.



and references that will enable us all to plug into decentralized work marketplaces. We can envisage technology sourcing and executing work projects by bringing in workers and services autonomously.

As the economy develops and demographics change, new technology adoption and the emergence of alternative business models make it inevitable that organizations themselves could change. The proportion of contractors and gig workers could be at higher levels because of the blockchain-enabled systems. Blockchain technology could respond to the needs and developments of organizations, which would need to be agile to operate in a global and transparent way. Work and workers will always be essential to organizations. The question is, what is the best way to deploy our workers in an increasingly globalized and automated economy?

ConsenSys: A decentralized autonomous venture

Based in New York City, Consensus Systems (ConsenSys) is one of the first Ethereum software development companies. A pioneer in management science, it uses a collaborative rather than hierarchical process for defining how work is done and who does it. It is incorporating the philosophies of *holacracy*, where roles are defined around the work to be done by the people who will do it, and interpreting it in a blockchain environment.⁴⁶ By operating on a hub-and-spoke model, contributors hold equity in projects, which incentivizes them to contribute their best, and agreements that are self-enforcing. Founder Joseph Lubin sees decentralized autonomous organizations owned and controlled by nonhuman value creators, and governed through smart contracts.

*Massive intelligence on a decentralized global computational substrate, an underlying layer, should change the architecture of the firm from a large collection of specialized departments run by humans, to software agents that can cooperate for longer periods of time to serve ongoing customer needs such as utility and maintenance. Others will swarm round a short-term problem solve it, dissolve just as quickly, having served their purpose.*⁴⁷

Work and workers will always be essential to organizations. The question is, what is the best way to deploy our workers in an increasingly globalized and automated economy?

Could this model unleash innovation and harness the power of human capital not only for wealth creation but also for sustained prosperity?

Moving to a new type of leadership: Managing teams with common purpose

As the cost of transactions falls with automation and adoption of blockchain-based talent platforms, leadership would need to manage virtual teams outside of traditional hierarchical structures. Leadership could shift some focus to defining the work, not just the employees.

Blockchain could play a key part in helping create communities of workers with healthier, transparent trust relationships, promoting fairness, and reducing inefficiencies. The concept of hiring could



be replaced by managing relationships as individuals collaborate in teams for different periods and rates. People operating in geographically dispersed teams could require aligned value systems to stay close to customers and present desirable behaviors and a shared culture. CHROs may need a new strategy to manage, coordinate, and align networks of teams, share information, work collaboratively, and, of course, motivate employees.

Networks of teams and the connected enterprise

Organizational structures are changing as jobs are becoming more specialized, people are working in teams with cross-functional boundaries, and success is being redefined by expertise, rather than span of control.

Traditionally, a job was a functional role defined by a set of responsibilities, competencies, a job title, and a career path. These functional roles were institutionalized around the world. Job descriptions prescribed the hiring process and organization charts placed functional roles in a hierarchy. The borderless workplace allows workers to interact seamlessly both inside and outside the organization. This shift could redefine what a job actually is.

Teams working in networks require different interpersonal skills than what worked in hierarchies. Cooperation is a fundamental behavior for effective work and this mode of work is where most of us could likely be working. Networks of teams rely on individuals to connect in a way that is unlike traditional hierarchies or working for a "boss." The networks could require a new holistic style of leadership. Team cooperation could presume the individual freedom to join and participate, and individuals in networks will not be told what to do as much as be influenced by other people. In a network model, a worker has to demonstrate value that is recognized by their team.

Organizations could extend the notion of work beyond collaboration, beyond teams, and beyond the corporate firewall in order to make social networks and communities of practice a part of the work narrative. The concepts of "the firm" and "the job" are changing. How distributed ledgers and blockchain factor into this transformation could form the next wave of organizations.

New approaches needed to understand team performance

The new talent platforms could be an excellent source of data on work performance and people receive rewards commensurate with their contribution, often as a member of a team, not necessarily by virtue of their position on the team.

Numbered are the days of *positional leadership*, where decision rights are assigned to job titles and positions. Blockchain decentralizes rights and power by democratizing data: when everyone can sense and monitor operational performance, it becomes a holistic part of the work experience. These organizational changes underway are



now accelerating with the widespread use of digital technology, a demanding younger workforce, and the need for more rapid business innovation.

We cannot manage what we cannot see. Technology that measures worker sentiment or the strength of relationships could enable effective and cohesive teams. If work is gradually moving away from hierarchies of talent to teams of external networks, then we need a new set of tools to understand team dynamics.

Successful team dynamics are critical in building organizations; however, many HR and people management processes are still designed around the individual, not the team. Institutionalized silos such as performance management, employee engagement, induction, and training are geared primarily to individual performance, not to team or unit performance.

Successful team dynamics are critical in building organizations; however, many HR and people management processes are still designed around the individual, not the team.

Organizational network analysis (ONA) is a useful way to see team dynamics in an organization. Tools such as NodeXL (nodexl.codeplex.com) will be increasingly important when our teams are comprised of employees, freelancers, and other contractors. ONA uses a variety of methods, including quick pulse surveys completed by employees that combine "me" questions (my opinions count) and "we" questions (I would like to appreciate the following individuals for helping me in my day-to-day work). Open feedback questions are also interspersed to understand sentiment and key issues. Visualizing team dynamics and relationships creates a strong foundation for organizations of the future based on a deeper understanding of what makes effective teams.



Entrepreneur preparation and job classroom by aniset, 2014, used under CC0 1.0.



The HR journey from transactions to people and change experts

Traditional HR skills in employee engagement, reward, pay research, hiring, training, and onboarding could become redundant as employees become self-sufficient in managing teams and resources.

HR has struggled throughout its history to demonstrate the value of people management expertise to the organization.

HR has struggled throughout its history to demonstrate the value of people management expertise to the organization. There are many systemic reasons for this, from poor theoretical models, and inconsistent data, to moving to best practice models without doing fundamental organizational design. Great teams and leaders that can harness people power will always power great, innovative organizations. HR teams that are embracing a new approach, utilizing workforce technology and an analytic and commercial mindset could sprint ahead of the competition. The CEO of SAP, Bill McDermott, recently stated, "There will be more CHROs promoted to CEO in the next five years than we have seen in the last 50."⁴⁸

A key role in the organization is to calculate the best combination of employees, contractors, or machines to carry out a package of work. It is up to HR to take on the role of custodian of workers, and to change expertise and organizational development. Creating learning environments for the whole work ecosystem and enabling effective collaboration could be key.

Many of the linear traditional processes, in hiring, learning and development, reward, and performance management could simply not be relevant in this new world of work. HR might take on a role procuring work that is much broader than hiring employees or contractors. As Don Tapscott argues, "HR needs to think about building business webs, ecosystems, and networks, rather than just building traditional vertically integrated corporations."⁴⁹

Implementation challenges

The journey

"We cannot solve our problems with the same thinking we used when we created them," said Albert Einstein. Blockchain development is now in a place similar to where the Internet was in the early 1990s. To attempt to predict how these solutions will scale, let us analyze vested interests for key industry players and possible adoption routes for organizations.

For these systems to develop, we need advocates, proponents, and visionaries. Leaders who can anticipate the potential implementation challenges and be bold enough to take a lead could transform the HR landscape and prepare their organization for the next generation of work.



Collaboration is required between organizations for successful blockchain development to agree, for example, on industry standards for the verified career profile. The first wave of blockchain technology will likely be confined to verifying identity, education, and training with some industries naturally collaborating to establish standards and protocols that users can adopt in a larger network for mutual benefit. The more organizations collaborating at the outset, the stronger the network will be.

Table 1: Ten start-ups using blockchain in HR and talent to watch

Start-up	What it does	Status as of Jan. 2018
APPII appii.io	Blockchain career verification platform uses verified credentials and an “Intelligent Profile” to record details permanently on a distributed ledger.	System live, currently onboarding candidates and verifying partners; ICO fundraising
bitJob bitjob.io	This global, decentralized marketplace for student employment, powered by Ethereum blockchain, allows voting, reputation, and micro-transactions for payments.	STU student token and bitJob alpha pilot live
Blocklancer blocklancer.net	Built on Ethereum, this distributed autonomous job marketplace focuses on the freelancing industry and includes a tribunal system to handle disputes.	Early beta phase—open for testing; ICO ongoing
CanYa canya.io	Blockchain-powered peer-to-peer marketplace of services for smaller jobs with payment in cryptocurrencies with a 1% transaction fee.	Global launch planned for March 2018; CAN token live
ChronoBank.io chronobank.io	LaborX is ChronoBank’s platform where employers can list jobs and freelancers can find employment from anywhere in the world, 24/7. It is focusing initially on payment of blue-collar contract workers in labor-hour tokens linked to average hourly wages in host countries.	LaborX to be launched early 2018; TIME token live; Partnering with Jobeum
CVproof cvproof.com	This venture is using blockchain technology to develop a platform enabling notarization of CV (curriculum vitae) and other credentials, all digitally validated and authenticated in a seamless process.	Launch in 2018; INK token live
Dock.io dock.io	This decentralized protocol for professional data, reputations, and networking management is built entirely on blockchain, powered by Ethereum.	App is currently live; Partnership with Remote.com with 2.3 million users
Etch etch.work	This global smart contract based payroll platform will allow real-time payments of wages and real-time sending of remittances.	Launching in UK first; Focusing on construction market; ICO complete
Indorse indorse.io	This venture is using new models of tokenization and decentralization to change the shape of professional social networking.	System live and currently onboarding individuals
R_Block rblock.co	In this decentralized anonymous hiring network, individuals own their work experience and reputation on the blockchain and earn CVTokens by sharing their profile.	Test system operational; ICO fundraising



We can learn from the introduction of cloud or mobile technologies to HR. In many cases, mapping the existing manual or paper-based processes and simply putting them online or creating mobile apps for them has simply replicated old design flaws that do not fully leverage the new technology. Given large expenditures on legacy systems, organizations tend to be conservative in adoption of new systems unless they are motivated by a competitive advantage. The implementation of blockchain solutions in HR gives an opportunity to rethink people management completely.

The HR and talent ecosystem

The speed of adoption of decentralized blockchain work and career systems will depend on many factors:

Mapping the existing manual or paper-based processes and simply putting them online or creating mobile apps for them has simply replicated old design flaws that do not fully leverage the new technology.

- » *Employers:* Businesses of all sizes could be the biggest beneficiaries of the emergence of blockchain solutions in HR and the labor market. Quality of hires could improve; costs could come down, as could people-related risks.
- » *Enterprise technology firms:* Given the potential benefits of blockchain, we should expect all major big technology players (e.g., Google, Microsoft, IBM, and SAP) to develop solutions for their customers. The opportunities for creating value from résumés and job descriptions on the Internet are huge. The incumbents with HR system solutions (e.g., SAP, Oracle, Workday, ADP) will need to adapt, and their enterprise clients could affect their business models in different ways.
- » *Intermediaries:* Owners of Internet talent platforms (e.g., Upwork, Manpower, and Freelancer) and staffing agencies (e.g., Kelly Services, Randstad, Adecco) will need to decide whether to convert to blockchain infrastructure or risk losing market share to new market entrants.⁵⁰
- » *Large HR suppliers:* A changing mix of permanent employees and contractors could affect players (such as Aon Hewitt) providing HR benefits or insurance to millions of permanent employees.
- » *Government agencies:* Tax authorities will have an interest in efficient and transparent tax collection. Governments around the world will need to respond to the expansion of the gig economy. In the United Kingdom, the Taylor Review of Modern Working Practices called for taxation of labor to be more consistent across different employment forms.⁵¹
- » *Labor unions:* Organized labor is reorganizing to support the rights of gig workers.⁵²
- » *Academia:* Theoretical and predictive models for human behavior and performance will improve with better data available. Universities have an opportunity to provide



The list of challenges for organizations is long, and CHROs can begin identifying and working to solve them.

verification of qualifications in the medium-term, but the role of the university itself could be challenged if learners can gain accreditation directly from respected teachers.

- » *Workers:* For workers, blockchain talent platforms might not directly affect the overall supply of work or improve financial security. Those who want to work on shorter-term projects could find flexible work arrangements. Those who need immediate payment might appreciate cryptocurrency and tokens. With transparency and a performance audit-trail, high performing workers with in-demand skills could do well, but the reverse is also true. The UK Taylor Review stated, "Platform based working offers welcome opportunities for genuine two-way flexibility and can provide opportunities for those who may not be able to work in more conventional ways."⁵³

Potential adoption barriers and how CHROs can help overcome them

The potential benefits of using blockchain systems, time-based payments, and smart contracts to manage workers and work tasks remain to be realized. We have suggested that rollout will occur in phases, but this journey will not be smooth or predictable. We could have periods of early adopters and experimentation, and new entrants to the market could bring unprecedented capabilities. The list of challenges for organizations is long, and CHROs can begin identifying and working to solve them:

- » *Defining universal standards.* The CHRO community can contribute to clear and concise definitions for personal career profiles that could replace the résumé and other work definitions.
- » *Documenting the nuances of employment history.* Validating historical data could be difficult. Therefore, a blockchain would initially be only a partial employment record. We need HR leaders with tenacity and vision to guide us in the early years when we might have parallel systems to manage. This might increase incidents of errors and frustration in the new system.
- » *Limited understanding of new technology.* Blockchain systems could be transforming industries in parallel with HR. The CHRO will need to work with technology partners to develop future solutions. One HR role could be that of workforce technology "evangelist" to champion this collaboration.
- » *Uncertain regulatory status.* CHROs must not only keep up with new legislation but also proactively participate in debate and lobby for policies.
- » *Poor adoption by candidates and workers.* There are benefits to candidates moving toward universal career profiles, more



opportunities, and immediate work payments. However, there might also be skepticism, particularly around job security, as most government responses lag behind employment practices. Verified career profiles could introduce more transparency. Workers with fewer in-demand skills might worry more than they already do about their competitive position in the job market. The CHRO can explain the benefits of improving the talent market to all stakeholders and support a communication campaign. New work platforms need to be perceived as better and fairer or the platforms will not gain the required network effect.

- » *Low adoption by HR and recruiters.* New technology combined with other trends might reduce the need for recruiters and HR personnel, rendering many skills and roles obsolete. CHROs could manage potential resistance to the transition carefully even as HR teams manage their own job security concerns.
- » *Getting the timing right.* Rate of adoption could be a function of market maturity vs competitive advantage. CHROs could have to develop an HR roadmap to include blockchain solutions.
- » *Applicant tracking systems and a reliance on keywords.* This is a current problem and is often an obstacle to applicants who already resort to writing multiple résumé versions in order to match specific keyword searches. HR needs to ensure they do not miss potential talent.
- » *Privacy breaches.* Asking candidates for information on their past wages or current age is illegal and discriminatory in some countries. Candidates could store such information in a blockchain and disclose it selectively to, say, government bodies but not to prospective employers. CHROs could ensure the development of HR policy that ensures confidentiality of personal data and safeguards against unauthorized access.



Workers training on electrical poles by skeeze, 2015, used under CC0 1.0.



Conclusions and recommendations

How do organizations attract and motivate a diverse group of employees, contractors, hourly staff, and suppliers? The boundaries that separate a company from its vendors, consultants, and customers are becoming harder to define as recruiting, contracting, and coordinating costs decline. CHROs must address workforce challenges, such as verification and compliance, and expedite payments to time-based workers in the near-term. In addition, talent markets and new organizational structures could be worthy of consideration in the longer-term.

Blockchain solutions could play a big part in transforming the world of work, along with other technological developments and demographic changes. The first wave of solutions in HR is likely to start with systems that provide verification of identity and qualifications, paying contractors in real-time, smart employment contracts, and eventually progressing to standards in electronic résumés. What can HR leaders do?

The first wave of solutions in HR is likely to start with systems that provide verification of identity and qualifications, paying contractors in real-time, smart employment contracts, and eventually progressing to standards in electronic résumés.

 **Continue to think broadly about work and how it could be completed.** The CEO and the CHRO must be aligned on business strategy, the HR vision, and the operating model to be fit for the future. Automation and outsourcing mean that an array of different providers on different terms could play various roles and do various tasks. This is also an opportunity to rethink the social contract between worker and employer.

 **Move from “jobs” and “work packages” to “skills” and “tasks.”** We need to think more in terms of tasks that need to be sourced rather than jobs that need to be filled. Trust in the talent market could increase, enabling more efficient talent exchanges. In the medium-term, the cost of transactions could decrease as organizations buy and sell many types of skills in open exchanges, leading to fairer remuneration for workers.

 **Encourage portfolio careers and verified career profiles.** Career development could increasingly include time working on shorter-term contracts as well as full-time positions for HR leaders and workers. It could also include experimentation with digital credentials (also known as open badges).

 **Work with technology providers to develop blockchain solutions.** The transition could have teething pain, and so we need leadership with tenacity and vision through the early transition to new systems. HR executives can actively contribute to innovations and developments in this space as it could change rapidly.

 **Get familiar with new blockchain applications and related technologies.** HR can be a pioneer in the new technology—not just blockchain but also artificial

Blockchain could eventually enable CHROs to access talent in a more profound way, fundamentally changing the role of HR and paving the way for radically new organizations.

intelligence, robotics, and the Internet of Things, all of which could eliminate some jobs and create new ones. Now is the time for HR professionals to become conversant in these innovations and demonstrate leadership in the transformation. Many of the start-ups mentioned are piloting new technology now.



Develop a vision for the HR function. Eventually, the major impact on HR could be on the firm itself, which may no longer require many current HR activities in payroll, corporate learning and development, recruitment, performance management, and benefits administration. The HR focus should be on how to enable self-organizing teams, measure and predict their performance, and ensure that talent systems are effective and fair.



Contribute to development of industry standards.

Given that we are in the very early stages of the new era, we cannot predict the likely timing of adoption of new blockchain solutions. However, CHROs can take the lead in creating better organizations and workplaces by contributing to work on industry standards (e.g., résumés, definition of good work) with HR bodies, technology groups, and government agencies.

Blockchain could initially reduce recruitment time, cost and risk. It could eventually enable CHROs to access talent in a more profound way, fundamentally changing the role of HR and paving the way for radically new organizations.

The challenges for the modern CHRO are part of the changing boundaries of the organization itself. If securing workers can be achieved more efficiently and effectively using resources that exist outside the organization, this raises some fundamental questions about the purpose of an internal capability, which tests the traditional business norms of human resources management.



About the author

Andy Spence is a human resources and workforce transformer with a mission to help develop better organizations. Founder of Glass Bead Consulting, he works at the intersection of technology, strategy, organizational change and HR. Long before Watson and Siri, Andy completed his masters in artificial intelligence and cognitive science. He has over 20 years of experience of innovative transformational change programs in banks, energy, health organizations, public sector, and retail. Andy is a professional member of the Centre for Evidence Based Management and attempts to contribute to better organizations with his writing, research, speaking, coaching, and training.





About the Blockchain Research Institute

Co-founded in 2017 by Don and Alex Tapscott, the Blockchain Research Institute is a knowledge network organized to help realize the new promise of the digital economy. It builds on their yearlong investigation of distributed ledger technology, which culminated in the publication of their critically acclaimed book, *Blockchain Revolution* (Portfolio|Penguin).

Our syndicated research program, which is funded by major corporations and government agencies, aims to fill a large gap in the global understanding of blockchain technology and its strategic implications for business, government, and society.

Our global team of blockchain experts is dedicated to exploring, understanding, documenting, and informing leaders of the market opportunities and implementation challenges of this nascent technology.

Research areas include financial services, manufacturing, retail, energy and resources, technology, media, telecommunications, healthcare, and government as well as the management of organizations, the transformation of the corporation, and the regulation of innovation. We also explore blockchain's potential role in the Internet of Things, robotics and autonomous machines, artificial intelligence, and other emerging technologies.

Our findings are initially proprietary to our members and are ultimately released under a Creative Commons license to help achieve our mission. To find out more, please visit www.blockchainresearchinstitute.org.

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