

**HUMAN
RIGHTS
CENTER**

UC Berkeley School of Law



Technology Solutions for Advancing Human Rights in Global Supply Chains

A Landscape Assessment

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June 2019

**Jesse Nishinaga
Faris Natour**

Human Rights and Business Initiative
University of California, Berkeley

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The Human Rights Center at the University of California (UC), Berkeley, School of Law conducts research on war crimes and other serious violations of international humanitarian law and human rights. Using evidence-based methods and innovative technologies, we support efforts to hold perpetrators accountable and protect vulnerable populations. We also train students and advocates to document human rights violations and turn this information into effective action.

The Human Rights and Business Initiative, a joint initiative of the Human Rights Center and the Center for Responsible Business at the Haas School of Business, envisions a world where all companies respect human rights. Launched in 2015, the Human Rights and Business Initiative works to advance the concept of rights-aware, decision making in business. Its mission is to equip current and future business leaders with the attitude and aptitude to advance business respect for human rights everywhere.

Human Rights Center, UC Berkeley School of Law, 2224 Piedmont Avenue, Berkeley, CA 94720
Telephone: 510.642.0965 | Email: hrc@berkeley.edu | www.humanrights.berkeley.edu
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ABBREVIATIONS

AI	Artificial Intelligence	ISO	International Organization for Standardization
API	Application Programming Interface	IT	Information Technology
CSR	Corporate Social Responsibility	KPI	Key Performance Indicator
DLT	Distributed Ledger Technology	ML	Machine Learning
DOL	United States Department of Labor	ROI	Return-on-Investment
ESG	Environment, Social, and Governance	SaaS	Software-as-a-Service
EUTR	European Union Timber Regulation	SLA	Service-level Agreement
FBA	Food, Beverage, and Agriculture	SMS	Short Message Service
ICT	Information and Communications Technology	UNGPs	United Nations Guiding Principles on Business and Human Rights
ILO	International Labour Organization	WEST	Worker Engagement Supported by Technology Principles

FORWARD



More than twenty years after the advent of the modern anti-sweatshop movement, far too many people who work in global supply chains continue to experience systemic barriers to a life of dignity, independence, and opportunity.

Since our launch in 2008, we at Humanity United have supported a variety of approaches and partners dedicated to addressing various forms of human exploitation. We believe addressing human rights challenges in global supply chains is an area where businesses can generate positive human rights impact. We also believe that technology can play a critical role in scaling this impact.

This report provides a comprehensive and practical view into the landscape of technology solutions that seek to advance human rights in global supply chains. This report captures early warnings, guidance, and suggestions on how to overcome many of the barriers that prevent technology solutions from achieving greater adoption, scale, and impact.

Our intent for this report is to help technology solutions providers and corporate and supply chain practitioners from all industries enhance their existing efforts or inspire new opportunities for technology-driven, positive human rights impact. Meanwhile, we will continue to assert that respecting human rights is a responsibility carried by those with power and influence in supply chains—from companies to suppliers to technology solutions providers—and this responsibility must be carried out whether or not technology fulfills its promise.

On behalf of Humanity United, we thank all those involved with putting together this report, and we look forward to bringing about change with you.

Dan Viederman
Managing Director, Humanity United

EXECUTIVE SUMMARY

Despite growing efforts by business, investors, civil society, and policymakers over the past two decades, workers in global supply chains continue to experience human rights abuses. The International Labour Organization (ILO) estimates that of the 24.9 million victims of forced labor in the world, about 16 million people are exploited in the private sector.¹

While conditions have improved in some industries, the absence of robust regulatory intervention and enforcement have opened the door for private sector interventions, including the use of technology solutions, to empower and safeguard the rights of workers and enable suppliers and companies to respect human rights and provide access to effective remedies. The challenge, however, is that many, if not most, of these technology solutions have yet to achieve the needed scale and impact.

While a significant number of articles, blogs, opinion pieces, events, and forums shed light on technology, human rights, and global supply chains, the public domain lacks more in-depth assessments and comparative studies on this subject. This study aims to close this information gap by providing companies, suppliers, and technology solutions providers with:

1. An assessment of current technology solutions on the market today that seek to address human rights challenges in global supply chains;

2. An understanding of existing barriers that prevent these technology solutions from achieving greater scale and impact; and
3. An identification of potential opportunities to overcome these barriers.

This landscape assessment provides substantial evidence of a significant market and global demand for technology solutions aimed at addressing human rights risks and challenges in global supply chains. Today, hundreds of millions of dollars are being spent on these technology solutions or are being invested in emerging technologies that may someday bring game-changing opportunities for millions of workers around the world. Key takeaways from this assessment include:

- The majority of technology solutions for companies and suppliers focus on supporting human rights due diligence, social compliance audits, self-assessments, and other traditional responsible sourcing activities. Several of these solutions are providing companies and suppliers with the ability to retrieve and analyze worker-generated data—some in real time. These solutions are presenting new opportunities for companies and suppliers to engage more directly with workers.
- Mobile solutions continue to be a useful technology for workers to raise grievances or access important information about their

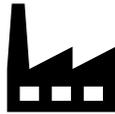
¹ Source: ILO, “[Global Estimates of Modern Slavery: Forced Labour and Forced Marriage](#),” 2017.



A “worker” is the primary rights holder and is employed on a full-time, part-time, or temporary or contractual basis by a supplier

Technology solutions assist workers with:

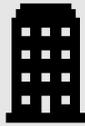
- Facilitating access to effective remedies
- Reporting grievances and actual or potential human rights violations
- Accessing critical information about their rights
- Communicating and sharing experiences with peers
- Tracking working hours or pay
- Reviewing or rating employers
- Searching for jobs and accessing worker-generated job or employer reviews



A “supplier” produces, manufacturers, assembles, or provides goods or services that are sold and delivered to a company

Technology solutions assist suppliers with:

- Data collection and exchange (with companies/buyers or other suppliers)
- Self-assessments on human rights policies and practices
- Measuring performance (e.g., outcomes and impact) on human rights
- Worker communication and engagement
- Worker surveys and feedback
- Worker recruitment and retention



A “company” is a multinational corporation or brand that purchases direct or indirect goods or services from a supplier

Technology solutions assist companies with:

- Human rights risk assessment and due diligence
- Mapping and visualization of human rights risks
- Supplier audit and compliance management
- Product traceability
- Predictive analytics and forecasting
- Consumer engagement (e.g., providing human rights–related information to customers or consumers)

rights. However, many workers mistrust or are intimidated by these technology solutions due to concerns about retaliation, discrimination, and potential adverse human rights impacts related to their use. Ensuring workers’ data privacy and security and protecting against data misuse are critical challenges that need to be addressed with these solutions.

- Emerging technology solutions, such as blockchain, artificial intelligence, and machine learning, are a growing area of

opportunity. These solutions collect and synthesize vast quantities of data to bring real-time, predictive intelligence and forecasting capabilities to companies and suppliers. However, while these emerging technologies are gaining support from investors, most of these technologies are not focused specifically on addressing human rights challenges in global supply chains. More direct and targeted application on human rights is a market gap and opportunity for these emerging technology solutions.

Barriers for workers include:

- Intimidation by or mistrust of technology solutions
- Limited access to technology and technology skills
- Limited voice in the design of technology solutions

Opportunities to overcome worker barriers include:

- Engage workers more frequently and close the feedback loop by sharing the outcomes of worker engagement with workers themselves
- Clarify the value proposition for workers by focusing on their interests and goals
- Include workers in the design of technology solutions and in the design of policies and practices that protect their data

Barriers for suppliers include:

- Transparency and change-management challenges
- Limited ownership to improve human rights policies and practices
- Limited incentives to move beyond compliance

Opportunities to overcome supplier barriers include:

- Invest in technology-based human rights solutions that focus on long-run improvements in productivity and operating margins
- Prioritize technology solutions that integrate with existing resource management systems
- Share (positive and negative) human rights data and compete on outcomes, not just on compliance

Barriers for companies include:

- Difficulty quantifying the business case for technology-based human rights solutions
- Limited decision-making power and implementation capabilities
- Data quality and comparability challenges

Opportunities to overcome company barriers include:

- Support the business case by breaking through internal information silos and sharing the outputs of technology solutions more widely
- Promote open-source human rights data to drive competition and improve trust and reputation with workers and consumers
- Develop common definitions for human rights data to advance impact measurement efforts and improve data interoperability

- The majority of technology solutions do not describe their use of responsible design principles, such as the [Worker Engagement Supported by Technology \(WEST\) Principles](#) or the [Principles for Digital Development](#).
- The majority of technology solutions also do not quantify the overall scale and impact of their efforts. Technology solutions providers have an opportunity to provide more quantitative data describing the business case and their positive impact on workers' human rights.

- The majority of technology solutions providers are headquartered in North America and Europe rather than in the sourcing or destination countries where workers live and work. While the reasons for this separation may differ from one technology solution to the next, this may point to the need for greater engagement between those who are developing technology solutions and the workers these solutions are ultimately trying to impact.

LOOKING AHEAD: PLACING WORKERS AT THE CENTER OF THE TECHNOLOGY AGENDA

To maximize the scale and impact of technology solutions, companies, suppliers, and technology solutions providers have opportunities to:

- **Align with responsible design principles.** Despite its potential and promise, technology cannot and should not replace responsible and ethical decision making, but should focus on building knowledge and enhancing users' ability to positively impact human rights. Furthermore, providers and users of technology solutions, while attempting to address one human right (e.g., free expression), should be attentive about unintentionally impacting or exacerbating another human right (e.g., privacy). Aligning with responsible design principles can help mitigate some of these risks.
- **Shift toward a more proactive, outcome-based model.** Many in the field believe a broader, behavioral and systemic shift needs to take place for technology to have greater scale and impact on human rights. Many of today's company-to-supplier-to-worker relationships—and many of the technology solutions included in this study—are based on the traditional social compliance and audit model. Practitioners urge a shift toward a more proactive, outcome-based model that emphasizes continuous improvement, supplier capability building, collaborative assessment, and worker engagement, empowerment, and well-being.
- **Use technology to facilitate business respect for human rights.** Fundamentally, technology should facilitate business respect for human rights. Human rights, by definition, are inalienable rights and companies and suppliers especially—whether or not there's a clear business

case—have a responsibility to respect human rights at all times. Companies and suppliers should draw from the [United Nations Guiding Principles on Business and Human Rights](#) and other standards and frameworks to develop sound human rights policies and practices, irrespective of the use of technology.

Looking ahead five to ten years, practitioners would like to see more representatives and leaders from other corporate functions (e.g., strategy, finance, human resources, IT, operations, government affairs, engineering, sales and marketing) driving the human rights and technology solutions agenda. Practitioners also would like to see more companies and suppliers from different industries engage on this subject and be willing to use their influence to drive impact and collaboration. Breaking down these internal and external silos will help elevate the technology and human rights agenda into the mainstream business agenda.

Finally, practitioners hope that over the next five to ten years—as more technology solutions emerge, common definitions and datasets are created, and system integrations occur—workers will be placed at the center of the technology solutions agenda. The dozens of companies, technology solutions providers, human rights advocates, supply chain specialists, and other leaders and experts who contributed to this study believe there is a strong need to create more opportunities to partner directly with workers to drive the technology solutions agenda.

Companies, suppliers, and technology solutions providers are encouraged to use this study to inform their own approach to identifying and prioritizing technology-driven opportunities that will help them achieve greater scale and impact on human rights in global supply chains.

BACKGROUND

Despite growing efforts by business, investors, civil society, and policymakers over the past two decades, workers in global supply chains continue to experience human rights abuses, including human trafficking, forced and child labor, hazardous working conditions, physical abuse and sexual violence, excessive working hours, and insufficient wages.

For instance, the International Labour Organization (ILO) estimates that there are approximately 24.9 million victims of forced labor in the world—and of this figure, about 16 million people are exploited in the private sector, in industries such as domestic work, construction, and agriculture. The ILO also estimates that more women than men are affected by privately imposed forced labor: about 9.2 million (58 percent) female and 6.8 million (42 percent) male. Furthermore, most victims of forced labor suffer from not just one, but multiple forms of coercion from employers or recruiters as a way of preventing them from being able to leave the situation.²

While conditions have improved in some industries, existing private sector approaches to addressing human rights abuses in global supply chains, primarily centered on social compliance audits, have not been able to consistently and broadly address the challenge, due in part to limited capacity and a lack of political will by

many governments in sourcing and destination countries to set and enforce standards for workplace practices that align with international human rights norms.³

In the absence of robust regulatory intervention and enforcement, supply chain workers in many countries and sectors—including migrant workers, which today account for more than 150 million workers globally—find themselves with:⁴

- Limited access to information about their rights;
- Limited opportunity to voice needs and concerns; and
- Limited ability to file grievances and gain access to remedies for human rights abuses.

As human rights advocates continue to call for more robust regulatory intervention and enforcement of human rights standards, private sector interventions—including the use of technology innovation—provide new opportunities to empower and safeguard the rights of workers and enable suppliers and companies to respect human rights and provide access to effective remedies. The challenge, however, is that many, if not most, of these technology solutions have yet to achieve the needed scale and impact.

² Source: ILO, “[Global Estimates of Modern Slavery: Forced Labour and Forced Marriage](#),” 2017.

³ Source: Council on Foreign Relations, “[Unfinished Business: Improving Labor Standards in Global Supply Chains](#),” 2016.

⁴ Source: ILO, “[ILO global estimates on migrant workers](#),” 2015.

CURRENT LITERATURE

While a significant number of articles, blogs, opinion pieces, events, and forums shed light on technology, human rights, and global supply chains, the public domain lacks more in-depth assessments and comparative studies on this subject. However, as this subject has gained more and more attention over the last several years, leading institutions and organizations have increased their funding to support research to explore this subject in greater depth. These studies have focused on specific human rights issues (e.g., human trafficking), specific industries (e.g., ICT), or specific technology solutions (e.g., blockchain) and have provided significant value to the field, including informing subsequent research.

Some of the more recent studies and efforts include:

- *“Transformative Technology for Migrant Workers Opportunities, Challenges, and Risks,”* published in November 2018 by the Open Society Foundations, examines five areas in which digital platforms are being developed to protect and empower migrant workers and considers practical, legal, ethical, and technological implications and the risks associated with them. The report concludes that digital technology cannot fix structural inequalities, missing institutional capacity, or a lack of political will to address labor exploitation. But when used responsibly and with worker protection and outcomes as a priority, it offers new and amplified opportunities for migrant worker empowerment and justice.⁵
- *“EnablingRights - The Transformative Potential of Digital to Enable People's Rights,”*

⁵ Source: Open Society Foundations, [“Transformative Technology for Migrant Workers: Opportunities, Challenges, and Risks,”](#) 2018.

⁶ Source: GeSI, [“EnablingRights - The Transformative Potential of Digital to Enable People's Rights,”](#) 2018.

published in 2018 by the Global e-Sustainability Initiative (GeSI), recommends that the information and communications technology (ICT) industry, in collaboration with all interested stakeholders, should take action to develop and apply what could be called “technology for human rights.” The report highlights examples of how ICT solutions are being applied constructively to help address and arrest human rights abuses. The report also defines a business case to help develop and apply technology solutions for human rights.⁶

- *“Blockchain technology and its relationships to sustainable supply chain management,”* published in September 2018 in the International Journal of Production Research, examines how blockchain, a potentially disruptive technology that is early in its evolution, can address and aid supply chain sustainability. Four blockchain technology adoption barriers categories—inter-organizational, intra-organizational, technical, and external barriers—are introduced.⁷
- *“Supply Chain Human Rights Risk Management: Blockchain and Emerging Technology,”* published in November 2018 by DLA Piper, outlines some of the potential opportunities and challenges presented by Distributed Ledger Technology (DLT), or blockchain, to manage human rights and responsible business conduct risks in supply chains and increase transparency. The paper is framed around investors' views on human rights risk management and supply chain transparency and focuses on examples from the minerals and metals supply chains.⁸

⁷ Source: International Journal of Production Research, [“Blockchain technology and its relationships to sustainable supply chain management,”](#) 2018.

⁸ Source: DLA Piper, [“Supply chain human rights risk management: Blockchain and emerging technology,”](#) 2018.

Table 1. Current Literature on Technology, Human Rights, and Supply Chain

Study	Scope
<i>Transformative Technology for Migrant Workers Opportunities, Challenges, and Risks</i>	<ul style="list-style-type: none"> • Scope: Supply chain • Rights holders: Migrant workers • Industry focus: All industries • Technology focus: Digital platforms for migrant worker engagement
<i>EnablingRights - The Transformative Potential of Digital to Enable People's Rights</i>	<ul style="list-style-type: none"> • Scope: Value chain • Rights holders: Workers, contractors, and customers • Industry focus: ICT industry • Technology focus: All types
<i>Blockchain technology and its relationships to sustainable supply chain management</i>	<ul style="list-style-type: none"> • Scope: Supply chain • Rights holders: Workers in global supply chains • Industry focus: All industries • Technology focus: Blockchain
<i>Supply Chain Human Rights Risk Management: Blockchain and Emerging Technology</i>	<ul style="list-style-type: none"> • Scope: Supply chain • Rights holders: Workers in global supply chains • Industry focus: Mining and extractives industries • Technology focus: Blockchain
<i>The role of digital technology in tackling modern slavery</i>	<ul style="list-style-type: none"> • Scope: Value chain • Rights holders: All people vulnerable to forced labor, human trafficking, and modern slavery • Industry focus: All industries • Technology focus: All types

- *“The role of digital technology in tackling modern slavery,”* published in June 2017, summarizes a dialogue formally exploring how digital information and communication technologies can provide opportunities for a step change in tackling modern slavery. Hosted by Wilton Park and in association with BT and Nokia, this dialogue has sparked new industry collaborations, such as [Tech Against Trafficking](#), a joint coalition of

technology companies collaborating with global experts to help eradicate human trafficking through the use of technology. Launched in June 2018 and led by the RESPECT Initiative and Business for Social Responsibility (BSR), the coalition’s goal is to work with civil society, law enforcement, academia, and survivors to identify and create technology solutions that disrupt and reduce human trafficking, prevent and

identify crimes, provide remedy mechanisms for victims, and support survivors through innovation, collaboration, guidance, and shared resources.^{9,10}

PURPOSE AND SCOPE OF STUDY

The purpose of this study is to provide:

1. An assessment of current technology solutions on the market today that seek to address human rights challenges in global supply chains;
2. An understanding of existing barriers that prevent these technology solutions from achieving greater scale and impact; and
3. An identification of potential opportunities to overcome these barriers.

This study is intended for companies, suppliers, and technology solutions providers seeking to address human rights challenges in global supply chains. Human rights-focused teams and practitioners within CSR, ethical sourcing, or supplier responsibility, are especially encouraged to use this study to inform their own approach to identifying and prioritizing technology-driven opportunities that will help them achieve greater scale and impact on human rights in global supply chains.

KEY DEFINITIONS

The following definitions have been developed for this study:

- A “worker” is an individual employed on a full-time, part-time, or temporary or contractual basis by a supplier, the primary employer of supply chain workers. This individual is the primary rights holder that this study seeks to improve outcomes for with technology solutions.

- A “supplier” produces, manufactures, assembles, or provides goods or services that are sold and delivered to a company. For this study, a supplier is a first-tier supplier of a multinational corporation.
- A “company” is a multinational corporation that purchases direct or indirect goods or services from a supplier, as defined above. For this study, a company is a brand or consumer-facing entity.
- A “technology solutions provider” is an organization that designs and brings to market technology-driven solutions, tools, or resources that seek to identify, prevent, or remediate human rights abuses in global supply chains.

This study recognizes that a company, such as a consumer goods retailer, employs low-wage workers who can benefit from many of the technology solutions reviewed in this study. However, this study focuses on supply chain workers versus workers who are directly employed by a company.

METHODOLOGY

The methodology for this study included three major components:

1. Literature review: The authors of this study reviewed publicly available literature to understand the current state of evidence on challenges and potential opportunities for using technology to address human rights challenges in global supply chains. The authors reviewed the five main studies referenced earlier in this section, as well as articles, blogs, and opinion pieces on this subject (see Appendix C for a full list of references).
2. Landscape review: To support the literature review, the authors of this study conducted semi-structured interviews with 20

⁹ Source: Wilton Park, “[The role of digital technology in tackling modern slavery](#),” 2017.

¹⁰ Source: BSR, “[Announcing a New Collaboration Using Tech to Combat Human Trafficking](#),” 2018.

companies, technology solutions providers, human rights advocates, and supply chain specialists to understand the landscape of technology solutions seeking to address human rights challenges in global supply chains. In total, the authors identified 44 technology solutions, which were then examined further to determine broad trends, gaps, and opportunities. The landscape review also helped inform the development of a set of hypotheses on key barriers and challenges preventing these technology solutions from achieving greater adoption, scale, and impact.

3. Stakeholder engagement: Insights from the landscape review and interviews set the foundation for two stakeholder workshops held at the University of California, Berkeley, in January and April 2019. Workshop participants—which included 32 practitioners, leaders, and experts from business, human rights, and technology—met to review existing barriers and challenges, discuss potential opportunities to overcome these barriers, and validate the study’s conclusions.

LIMITATIONS

This study is based primarily on publicly available information and qualitative insights provided by practitioners, leaders, and experts in the technology, human rights, and supply chain field. Findings and conclusions are based on the authors’ review of 44 technology solutions

identified for this study and not the entire universe of technology solutions that exist on the market today.

Additionally, while a good faith effort was taken to develop insights that all types of companies, suppliers, and technology solutions providers may find relevant and useful, the findings and conclusions in this study are based on a limited sample size of perspectives and, ultimately, do not represent the entire breadth and depth of perspectives on barriers, challenges, and opportunities. This study recognizes that more direct input from workers and suppliers could have bolstered the study’s findings and conclusions. Future researchers should consider addressing this research gap.

Furthermore, the inclusion of technology solutions in this study, including those highlighted as example solutions (on pages 14 through 16), does not mean an endorsement of these solutions by any of the organizations that funded, supported, or contributed to this study. Information sources, including primary and secondary sources, are referenced throughout this report. Statistical evidence and results provided throughout this report have not been tested for their statistical significance.

The content of this report reflects the views of the authors, who worked independently and are not representative or reflective of the positions of the supporting organizations. Any errors, omissions, or misinterpretations are those of the authors of this report.

LANDSCAPE REVIEW

The landscape of technology solutions is varied and multi-dimensional, serving a wide range of purposes and users. For this study, four general categories of technology solutions have been identified:

 **Desktop solutions:** These technology solutions are typically Software-as-a-Service (SaaS)-, hosted-, or cloud-based solutions that companies and suppliers use to collect, exchange, manage, and analyze relevant human rights data. For example, a supplier might use a cloud-based, collaborative platform to track human rights data and share this data with buyers, auditors, or other suppliers.

 **Mobile solutions (e.g., voice, messenger tools, SMS, smartphone apps):** These technology solutions are typically either: a) an extension of or supplement to desktop solutions that companies and suppliers use to access similar data, analysis, and functionalities as their desktop counterpart; or b) a worker engagement tool that enables workers to raise grievances, access critical information about their rights, share information with peers, provide feedback to employers, or take surveys. Companies and suppliers also use mobile solutions to gather information about working conditions.

 **Blockchain:** Blockchain is a digital ledger that is inherently secure, open and transparent, and unchangeable. An emerging technology for human rights, technology

Chart 1. Technology Solutions by Type¹¹

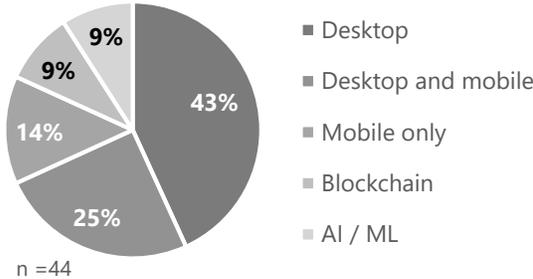
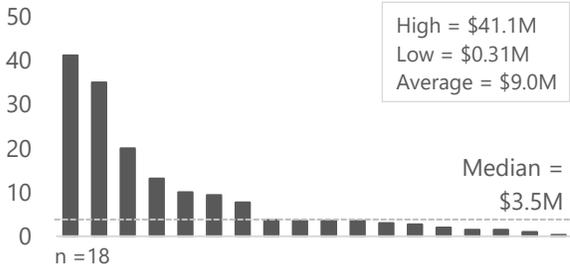


Chart 2. Median Market Size of Solutions (based on annual revenue, in millions, M)¹²



solutions developers believe there is significant potential for blockchain to improve supply chain transparency and verify “chain of custody” to ensure products can be traced back to an ethical source.

 **Artificial intelligence (AI) and machine learning (ML):** AI and ML (a subset of AI) use massive amounts of data and complex algorithms to constantly learn and improve on their ability to create models or simulations,

¹¹ Chart is based on authors’ analysis of technology solutions identified for this study.

¹² Chart is based on authors’ analysis of data retrieved from [Crunchbase.com](https://www.crunchbase.com).

Chart 3. Primary Objectives of Technology Solutions by User Group



Worker solutions assist workers with:

- Facilitating access to effective remedies
- Reporting grievances and actual or potential human rights violations
- Accessing critical information about their rights
- Communicating and sharing experiences with peers
- Tracking working hours or pay
- Reviewing or rating employers
- Searching for jobs and accessing worker-generated job or employer reviews



Supplier solutions assist suppliers with:

- Data collection and exchange (with companies/buyers or other suppliers)
- Self-assessments on human rights policies and practices
- Measuring performance (e.g., outcomes and impact) on human rights
- Worker communication and engagement
- Worker surveys and feedback
- Worker recruitment and retention



Company solutions assist companies with:

- Human rights risk assessment and due diligence
- Mapping and visualization of human rights risks
- Supplier audit and compliance management
- Product traceability
- Predictive analytics and forecasting
- Consumer engagement (e.g., providing human rights–related information to customers or consumers)

make forecasts or predictions, or replace or augment human decisions. An emerging technology for human rights, these solutions may be able to forecast human rights risks and help users address these risks before they occur.

KEY FINDINGS

A landscape review of technology solutions revealed the following trends, gaps, and opportunities:

- The estimated median market size of technology solutions—based on the annual revenues of 18 solutions with publicly available market data—is \$3.5 million (see Chart 2). A comprehensive market study conducted by the Monitor Institute also

estimates that the overall market for socially responsible supply chain tools (excluding audit tools) ranged from \$807 million to \$2.1 billion in 2018. The Monitor Institute further estimates that this figure could reach to as high as \$2.7 billion over the next five years.

- Many of these solutions seek venture capital, in addition to generating revenue. Based on publicly available venture funding data of 10 solutions, more than \$143.3 million have been invested in these 10 solutions to date. Among these examples, about 91 percent of venture capital is going to AI- or ML-based technologies.
- The majority of solutions are relatively new to the market—about 70 percent of technology solutions launched between

Example Solution:
Laborlink



Laborlink by ELEVATE is a mobile platform that establishes a two-way communication channel for workers to share their viewpoints in real time and for organizations to have clear visibility of worker well-being in their supply chains. Since 2010, Laborlink technology has been deployed in 22 countries and has reached more than 2.5 million workers worldwide.

Type:   Used by:   

Website: elevatelimited.com

Example Solution:
Ulula



Ulula is a multi-language supply chain management, stakeholder engagement, and monitoring and evaluation software. Ulula provides workers with a safe and effective mechanism for reporting incidents and abuse in the workplace. Companies and suppliers also use Ulula to communicate with workers in real time and get direct and reliable data on worker and community voice.

Type:   Used by:   

Website: ulula.com

2010 and 2019 and the remaining 30 percent launched between 2000 and 2010.

- The vast majority of technology solutions are developed in the United States, followed by the United Kingdom (UK). No technology solutions provider reviewed in this study maintains its headquarters in countries in Central and South America or in the Middle East (see Appendix A, Chart 4).
- About two-thirds of technology solutions on the market today are desktop solutions used by companies or suppliers. Of these solutions, more than one-third of them provide an accompanying mobile version.
- About 1 in 7 technology solutions are exclusively mobile-based platforms. These solutions are used by workers to access effective remedies or critical information about their rights. Workers also use these mobile or smartphone solutions to track their working hours and pay to safeguard their right to fair and accurate remuneration.
- About 1 in 6 technology solutions are blockchain- or AI/ML-based solutions. The majority of these emerging technology solutions do not explicitly describe

themselves as aimed at addressing human rights challenges in global supply chains. However, many of these emerging technology solutions may have significant potential for doing so in the future.

- About 40 percent of technology solutions do not describe any specific human rights issue being targeted for remedy. These solutions, therefore, can be referred to as issue-agnostic tools helping companies and suppliers with general management activities, such as gathering and sharing supply chain data, conducting due diligence and impact assessments, or managing social compliance and audit protocols.
- For the other 60 percent of solutions that do describe specific issues they are targeting, the top 6 most frequently cited issues are: wages and hours; working conditions; child and forced labor; migrant labor rights; labor recruitment and retention; and human trafficking.
- More than half of technology solutions describe having customers or users in specific industries. The food, beverage, and agriculture (FBA) industry is the most

Example Solution:
MicroBenefits



MicroBenefits's CompanyIQ is a mobile application that provides companies with greater transparency into many aspects of their supply chains, including grievance, audits, and supplier capability. The tool enables companies to interact directly with workers to gain more insights, monitor zero-tolerance issues more effectively, and automate certain audit processes to mitigate risk.

Type:   Used by:   

Website: microbenefits.com

Example Solution:
EcoVadis



EcoVadis is a SaaS platform that brings companies and suppliers together to efficiently drive CSR and sustainability performance through reliable CSR ratings and scorecards covering 21 CSR Indicators, 190 commodities, and 150 countries. The methodology is built on international CSR standards, including the Global Reporting Initiative, the United Nations Global Compact, and the ISO 26000.

Type:  Used by:  

Website: ecovadis.com

frequently cited industry, followed by the apparel, energy and extractives, consumer goods, and manufacturing industries.

- About one-third of technology solutions describe specific countries or locations with customers or users in. Of these solutions, the majority of them target customers or users in Asia, which is home to many of the major sourcing countries of multinational corporations.
- Several labor “corridors” also surfaced—such as the United States-Mexico corridor and the Japan-Philippines corridor—where some technology solutions are being used to support labor migration or help address human trafficking between these locations.

MAIN TAKEAWAYS

1. The majority of technology solutions for companies and suppliers focus on supporting human rights due diligence, social compliance audits, self-assessments, and other traditional responsible sourcing activities. Several of these solutions are providing companies and suppliers with the ability to retrieve and analyze worker-

generated data—some in real time. These technology solutions are presenting new opportunities for companies and suppliers to engage more directly with workers.

2. Mobile solutions continue to be a useful technology for workers to raise grievances or access important information about their rights. However, while many workers in global supply chains possess mobile phones and, therefore, can access mobile-based technology solutions, some practitioners believe other related challenges—such as accessing the Internet or electricity (to charge one’s phone), ensuring data privacy and security, or protecting against data misuse—are not always adequately addressed.
3. Emerging technology solutions, such as blockchain, AI, and ML, are a growing area of opportunity. These solutions collect and synthesize vast quantities of data to bring real-time, predictive intelligence and forecasting capabilities to companies and suppliers. However, most of these emerging technology solutions are not focused specifically on addressing human rights

Example Solution:
Worker Connect



Worker Connect is a mobile-based app and dashboard for migrant construction workers to learn about their rights, share information about their experiences, and provide anonymous feedback to supervisors and employers. Employers can organize and visualize key information securely and pinpoint and solve problems before they become larger issues.

Type:   Used by:  

Website: workerconnect.org

Example Solution:
BanQu



BanQu is a blockchain-for-service software company that builds economic identities and connects people in extreme poverty to the global supply chains they participate in and the brands, organizations, and governments that power them. BanQu's platform works universally on any device, from the oldest to the newest cell phones, and users decide what information to share and with whom.

Type:    Used by:  

Website: banqu.co

challenges in global supply chains. More direct and targeted application on human rights is a market gap and opportunity for these emerging technology solutions.

4. The majority of technology solutions do not describe the use of responsible design principles, such as the [Worker Engagement Supported by Technology \(WEST\) Principles](#) or the [Principles for Digital Development](#). Public disclosure of this information is a noticeable gap.
5. The majority of technology solutions also do not quantify the overall scale and impact of their efforts. While many technology solutions providers share examples of use cases, few provide quantitative data, such as the number of users, workers, customers, suppliers, countries reached, or datapoints collected. Furthermore, virtually no technology solutions provide data on its positive impact on workers or on key business drivers, such as speed-to-market, service-level agreement (SLA) performance, absenteeism, turnover, or cost savings. Technology solutions providers have an

opportunity to provide more quantitative data describing the business case and their positive impact on workers' human rights.

6. There is early evidence suggesting a potential trend toward greater investment in AI- and ML-based technology solutions. Some investors are gaining confidence in the potential of these emerging technologies to tackle complex, global challenges. In terms of advancing human rights in global supply chains, these emerging technology solutions have the potential to forecast or predict human rights risks and help users address these risks before they occur.
7. The majority of technology solutions providers are headquartered in North America and Europe rather than in the sourcing or destination countries where workers live and work. While the reasons for this separation may differ from one technology solution to the next, this may point to the need for greater engagement between those who are developing technology solutions and the workers these solutions are ultimately trying to impact.

BARRIERS TO SCALE AND IMPACT

Workers, suppliers, and companies face a wide range of barriers and challenges that are preventing technology solutions from achieving greater adoption, scale, and impact. Through a series of interviews and workshops with companies, technology solutions providers, human rights advocates, and supply chain specialists, the most common and systemic barriers and challenges have been identified across key user groups.

WORKER BARRIERS

- **Intimidation by or mistrust of technology solutions.** Many workers are intimidated by technology solutions due to concerns about retaliation and adverse human rights impacts related to their use. Workers are not always clear about the extent to which these technology solutions will protect their personal information or whether or not their data will be shared with other parties without their consent. Worker voice platforms, for instance, can leave workers even more vulnerable to abuse if the proper encryption, controls, and privacy systems are not in place. Digital identification tools can make workers visible and provide them with access to critical services, such as banking, education, healthcare, and other public and private benefits. However, these tools also can put workers in a compromising position and make them vulnerable to discrimination if their personal data is lost or misused.
- **Limited access to technology and technology skills.** While many workers, especially many young workers, have access

to mobile phones, other related challenges, such as accessing Internet service or electricity (to charge one's phone), often limit their ability to benefit from the use of these technology solutions. Improving workers' awareness, education, and skills related to technology also is a challenge and opportunity for many companies and suppliers. For instance, even if tools to access grievance mechanisms are available, many workers are simply not made aware of them. Without addressing these access-, communication-, and training-related barriers to technology, many workers will miss out on the intended benefits of these technology solutions.

- **Limited voice in the design of technology solutions.** Workers often have limited say in how technology solutions are designed, particularly solutions that are used directly by them. Technology solutions should be designed with workers' input so that they are culturally appropriate and take into account their specific needs and circumstances. For example, technology solutions need to recognize that many workers may not be able to read, may have numeracy challenges, or may be experiencing other socioeconomic or environmental barriers. Cultural and community norms and local context need to be accounted for when designing these technology solutions.

SUPPLIER BARRIERS

- **Transparency and change-management challenges.** While technology solutions may bring new human rights data and insights to suppliers, these solutions also may uncover issues that they may not be prepared to address even when there is a strong willingness and fundamental interest to respect human rights. Some practitioners believe that many suppliers do not have the capabilities or resources to adequately address the changes that would be required of them as new technology solutions would demand greater transparency of their policies and practices to respect workers' human rights. With thin operating margins and limited access to capital, many suppliers may already be under significant pressure to meet business objectives and have limited time and resources to pursue new technologies and change-management opportunities.
- **Limited ownership to improve human rights policies and practices.** Some practitioners also believe that because companies generally determine or influence a supplier's workload, ownership over the negative ramifications of that workload should remain primarily with companies. Consequently, some suppliers do not feel full ownership to change or improve their human rights policies and practices despite their responsibility to do so. This ownership "imbalance" may be a byproduct of the complex power dynamics at play in many buyer-supplier relationships. These power asymmetries can vary across supply chains, industries, companies, teams, and individuals with different agendas, priorities, and even personalities.
- **Limited incentives to move beyond compliance.** Beyond ownership and accountability challenges, some suppliers simply do not feel compelled enough to change or improve their human rights policies and practices, let alone invest in new

"How do we improve the power dynamics that exist between buyers and suppliers? How can we get suppliers more incentivized to change and improve behaviors? We need breakthrough ideas for 1st tier suppliers that are pragmatic for them to implement."

– Supply Chain Specialist

technology solutions. Current methods for improvement are still based on the traditional social compliance and audit model, where suppliers have incentive to do "just enough" to "pass" the periodic third-party inspection or audit. Leading companies are increasingly adopting outcome-based methods, focusing on tackling root-cause issues, building supplier capabilities, deploying supplier recognition schemes, and providing trainings and resources to factory managers and workers. However, practitioners believe that these efforts have yet to reach industry scale and the majority of suppliers still operate under the traditional social compliance and audit model—a model that prioritizes meeting buyers' audit protocols, standards, and codes of conduct.

COMPANY BARRIERS

- **Difficulty quantifying the business case for technology-based human rights solutions.** If quantifying the ROI or cost-benefit of any new technology solution is difficult enough, overlaying the business

“We’re actually pretty aware of the landscape of technologies that are out there and do not have too much difficulty finding solutions that could work for us. The bigger challenge for us is whether or not the solution has a clear business case, a positive return on investment, and can be integrated into our existing system.”

– Corporate Practitioner

impact of human rights into the calculation can be even more challenging. While significant external research has been done to substantiate some of the broader economic arguments for business to respect human rights—such as mitigating financial cost, cost for out-of-court settlements, information-disclosure cost, reputational damage, and potential decline in stock price¹³—there are no commonly used templates or methodologies for quantifying the business impact of technology-based human rights solutions. Making a more effective business case for integrating these technology solutions will likely improve internal buy-in.

- **Limited decision-making power and implementation capabilities.** Human

rights-focused teams often do not have the decision-making power or budget to purchase new technology solutions without obtaining executive sponsorship and buy-in from other key departments, such as IT, procurement, or operations. Technology solutions are inherently costly and need to be integrated into existing systems, which can be a massive undertaking that many enterprises are not willing to make without a proven business case. Even if buy-in can be achieved, implementation is a time-intensive process and may require significant in-house technical expertise, which may not be readily available and may require additional hiring or training. Many human rights-focused teams do not have the budget, time, or required experience and skillset to implement technology solutions effectively and passing on some of these challenges and costs to suppliers is usually not a good option either.

- **Data quality and comparability challenges.** Some companies perceive an underlying challenge with data quality and comparability. How robust are the data gathering, management, and governance systems? How are these systems creating reliable data that is not easily damaged or corrupted when new or old data is introduced? How are these systems ensuring data completeness and accuracy so that the data represents what it is supposed to represent? Without some standardization for how data is gathered, attributed, and analyzed, companies will have limited ability to measure or compare their performance with others and create a marketplace where good performance on business and human rights are mutually reinforcing objectives.

¹³ Source: ICAR et al., “[Good Business: The Economic Case for Protecting Human Rights](#),” 2018.

OPPORTUNITIES TO OVERCOME BARRIERS

Many of the barriers preventing technology solutions from achieving greater adoption, scale, and impact are systemic barriers that may require industry-wide or cross-sector collaboration, while other barriers may require a more targeted approach by individual companies, suppliers, and technology solutions providers. This study divides these opportunities to overcome barriers by user group.

OPPORTUNITIES TO OVERCOME WORKER BARRIERS

- **Engage workers more frequently and close the feedback loop by sharing the outcomes of worker engagement with workers themselves.** Many workers do not directly see the positive results of worker engagement efforts and continue to feel that their feedback is not being heard and acted upon, leading to further mistrust of

“We need to close the ‘feedback loop’ with workers more quickly and in ways that provide meaningful results for workers who use technology.”

– *Business and Human Rights Advocate*

technology solutions and the companies and suppliers that are behind them. To address this rift, companies and suppliers should engage more frequently with workers and leverage technology solutions to measure and share the outcomes of these engagements. Simpler and more frequent feedback loops with workers—versus larger, but less frequent checkpoints, which can be overwhelming for many workers—will help build a “longitudinal” relationship with workers and create a culture where workers feel more empowered to provide regular feedback and feel less overwhelmed by the one-time “big” engagement.

- **Clarify the value proposition for workers by focusing on their interests and goals.** A critical element of worker engagement is improving the way in which companies and suppliers understand and act upon not only workers’ immediate needs and expectations, but also their broader interests, goals, and even aspirations. How can this job improve the workers’ overall situation and well-being? How can technology help the worker and supplier achieve these outcomes? By putting the workers’ interests at the center of their relationship, workers and suppliers will begin to form a mental and physical model of work that is based on partnership rather than “command-and-control,” leading to improved outcomes for workers and suppliers.
- **Include workers in the design of technology solutions and in the design of**

policies and practices that protect their data. Some of the most important principles of responsible design (see page 24 for examples) are: a) including workers in the design of technology solutions, and b) making sure data management policies and practices prioritize workers' safety. Technology solutions providers should adopt these principles to extend the impact of technology-driven efforts on workers, companies, and suppliers. Companies and suppliers also should communicate and promote these principles with current and prospective technology solutions providers and consider asking these technology solutions providers to acknowledge and adhere to these principles as a condition of purchase and adoption.

“There is a growing business case, not to mention a moral call, for using technology to make a positive impact in our supply chains. We need to see each other as allies in the movement to advocate for the promise of technology to be realized. It won't happen just because it makes sense to us.”

– Corporate Practitioner

OPPORTUNITIES TO OVERCOME SUPPLIER BARRIERS

- **Invest in technology-based human rights solutions that focus on long-run improvements in productivity and operating margins.** To address change-management challenges, suppliers should view technology-based human rights solutions as a long-run investment strategy to improve productivity and operating margins. By extending the time horizon, suppliers can more easily make the internal business case for these solutions and calculate their direct, positive impact on productivity metrics—such as worker attendance, turnover, quality, output, yield, on-time rate, and so on—which can all be translated into a monetary value and benefit the bottom-line. Suppliers will need to include training time and the cost of any training incentives they may offer to workers into the cost-benefit analysis. But in general, by framing these technology solutions as long-term investments, suppliers can alleviate some of the shorter-term change-management constraints and send a strong signal to their corporate buyers that they are equally committed to upholding their responsibility to respect workers' human rights.
- **Prioritize technology solutions that integrate with existing resource management systems.** To minimize implementation costs and avoid “technology fatigue,” suppliers can prioritize technology solutions that complement or enhance existing resource management systems. Like the previous opportunity, this will enable suppliers to frame technology-based human rights solutions as “business management tools” that improve operational efficiency and productivity, not only worker well-being and working conditions. This opportunity also supports the broader trend toward addressing the root causes of poor management decisions that often lead to disastrous consequences for workers' human rights.
- **Share (positive and negative) human rights data and compete on outcomes, not just on compliance.** To address transparency challenges and create new incentives for respecting workers' human rights, suppliers should share their human rights data with other suppliers and

Table 2. Opportunities to Overcome Barriers and Next Steps for Practitioners

	Barriers	Opportunities
 <p>Worker barriers:</p> <ul style="list-style-type: none"> • Intimidation by or mistrust of technology solutions • Limited access to technology and technology skills • Limited voice in the design of technology solutions 		<p>Opportunities to overcome worker barriers include:</p> <ul style="list-style-type: none"> • Engage workers more frequently and close the feedback loop by sharing the outcomes of worker engagement with workers themselves • Clarify the value proposition for workers by focusing on their interests and goals • Include workers in the design of technology solutions and in the design of policies and practices that protect their data
 <p>Supplier barriers:</p> <ul style="list-style-type: none"> • Transparency and change-management challenges • Limited ownership to improve human rights policies and practices • Limited incentives to move beyond compliance 		<p>Opportunities to overcome supplier barriers include:</p> <ul style="list-style-type: none"> • Invest in technology-based human rights solutions that focus on long-run improvements in productivity and operating margins • Prioritize technology solutions that integrate with existing resource management systems • Share (positive and negative) human rights data and compete on outcomes, not just on compliance
 <p>Company barriers:</p> <ul style="list-style-type: none"> • Difficulty quantifying the business case for technology-based human rights solutions • Limited decision-making power and implementation capabilities • Data quality and comparability challenges 		<p>Opportunities to overcome company barriers include:</p> <ul style="list-style-type: none"> • Support the business case by breaking through internal information silos and sharing the outputs of technology solutions more widely • Promote open-source human rights data to drive competition and improve trust and reputation with workers and consumers • Develop common definitions for human rights data to advance impact measurement efforts and improve data interoperability

companies in their immediate industry to generate a “race to the top,” where suppliers compete with other suppliers on improving their human rights performance versus competing just on compliance results.

Technology solutions providers can provide the right metrics, data safeguards, and mechanisms to ensure a level playing field and facilitate the collection and exchange of both positive and negative human rights

Next Steps for Practitioners

Companies and suppliers should:

1. Conduct interviews and/or focus groups with workers to understand their technology challenges, opportunities, and goals
2. Assess whether or not current technology solution(s) can support workers' goals
3. Adopt new technology solution(s) and training curriculum if current solutions cannot support workers' goals

Suppliers should:

1. Identify the root causes of actual and potential human rights abuses and what current management and operational constraints are directly or indirectly leading to these abuses
2. Use existing technology solutions or adopt new ones that reduce management and operational pressures

Companies should:

1. Use existing technology solution(s) to gather and synthesize all available data on human rights impact
2. Share data and results on human rights impact with other corporate functions and hold a discussion on how this information may be relevant and useful to them
3. Share data and results with external stakeholders (e.g., via annual CSR report) to improve trust and reputation with them

data. Companies can provide suppliers with commercial incentives, such as price, volume, duration, and supplier preference.

OPPORTUNITIES TO OVERCOME COMPANY BARRIERS

- **Support the business case by breaking through internal information silos and sharing the outputs of technology solutions more widely.** To address the ongoing challenge of quantifying the business case for technology-based human rights solutions, human rights–focused teams have the opportunity to share the data insights and outputs of technology solutions more widely across their organization. Doing so will help human rights–focused teams break down some of the internal information silos between themselves and other corporate functions. Over time, these teams may see an overall improvement in the perceived or actual value of these technology-based human rights solutions. If more corporate functions across an organization learn about and benefit from the data and insights gathered through these technology solutions, the easier it will become for human rights–focused teams to make the business case for these solutions. Over time, human rights–focused teams also may see their internal decision-making power improve.
- **Promote open-source human rights data to drive competition and improve trust and reputation with workers and consumers.** Like suppliers, companies also have the opportunity to leverage technology solutions to collect and share more information about their human rights performance. External initiatives, such as the [Corporate Human Rights Benchmark](#) and [KnowTheChain](#), are providing useful industry benchmarks that help drive competition on human rights policies, practices, and performance. A further step can be made by making human rights data open-source. By promoting greater transparency and making supply chain human rights performance data more freely available, competition among companies will increase and, over time, may help improve their overall trust and

reputation with workers, consumers, and other key stakeholders who are concerned about corporate human rights abuses.

- **Develop common definitions for human rights data to advance impact measurement efforts and improve data interoperability.** Without a common standard, method, or framework to define data, assign value to data, and attribute data with certain qualities, characteristics, or categorizations, technology solutions providers, companies, and suppliers will continue to find it difficult to measure their human rights impact accurately and make meaningful comparisons. For example, how one company defines “access to technology,” “worker well-being” or

“remedy” could be substantively different than how another company might define the same terms or concepts. This is an opportunity for a third-party institution, standard setter, or consortium of stakeholders to develop a “data dictionary” that provides: a) common definitions for commonly used concepts, terms, metrics, and indicators; and b) common taxonomies that help categorize data in ways that would support more accurate and comparable impact measurement efforts. Creating a data dictionary also will help address the challenge of data interoperability so that different technology solutions and information systems can work more seamlessly together.

Examples of Responsible Design Principles



The WEST Principles aim to maximize the impact of technology-driven efforts to identify and address the risk of abuse and exploitation of workers in global supply chains. By encouraging the adoption of a common set of guidelines, the Principles seek to ensure the use of technology will meaningfully affect workers’ lives. Initiated by a group of technology providers, the Principles seek to engage stakeholders at all levels of global supply chains to collectively develop a roadmap to operationalize their use.

Website: westprinciples.org



The Principles for Digital Development are nine guidelines that are designed to help integrate best practices into technology-enabled programs and are intended to be updated and refined over time. They include guidance for every phase of the project life cycle and they are part of an ongoing effort among development practitioners to share knowledge and support continuous learning.

Website: digitalprinciples.org

CONCLUSIONS

This landscape assessment provides substantial evidence of a significant market and global demand for technology solutions aimed at addressing actual and potential human rights risks and challenges in global supply chains. Today, hundreds of millions of dollars are being spent on these technology solutions or are being invested in emerging technologies that may someday bring game-changing opportunities for millions of workers around the world.

While this study focused on identifying current trends, gaps, and opportunities among technology solutions on the market today, this study also helped substantiate a deeper insight: The human rights challenges we face ultimately

stem from human decisions, perceptions, interactions, and complex power structures and dynamics—all of which technology alone cannot fix. This study warns about the risk of “dehumanizing” human rights by focusing too much on the promise and potential of technology. Technology cannot and should not replace responsible and ethical decision making, but should focus on building knowledge and enhancing users’ ability to positively impact human rights.

Furthermore, many practitioners are concerned that, while attempting to address one human right (e.g., free expression), some technology solutions may unintentionally impact or exacerbate another human right (e.g., privacy). This potential scenario must be top-of-mind for technology solutions providers, but also for the companies and suppliers that seek to use these technology solutions. Aligning with responsible design principles can help mitigate some of these risks.

This study also recognizes that a broader, behavioral and systemic shift needs to take place for technology to have greater scale and impact on human rights. Many of today’s company-to-supplier-to-worker relationships—and many of the technology solutions included in this study—are based on the traditional social compliance and audit model. To reach the next stage of scale and impact, practitioners urge a shift toward a more proactive, outcome-based model that emphasizes continuous improvement, supplier capability building, collaborative

“We have to make sure technology does not replace real management solutions. Technology solutions can build credibility by helping us identify and remediate the root causes of human rights abuses.”

– Business and Human Rights Advocate

assessment, and worker engagement, empowerment, and well-being.

Looking ahead five to ten years, practitioners would like to see more representatives and leaders from other corporate functions (e.g., strategy, finance, human resources, IT, operations, government affairs, engineering, sales and marketing) driving the human rights and technology solutions agenda.

Practitioners also would like to see more companies and suppliers from different industries engage on this topic and be willing to use their influence to drive impact and collaboration. Practitioners observe that the same companies are generally at the table exploring ways to solve these issues. Global scale and impact will never be achieved if only a handful of organizations are regularly engaged.

Finally, practitioners hope that over the next five to ten years—as more technology solutions emerge, common definitions and datasets are created, and system integrations occur—workers will be placed at the center of the technology solutions agenda. The dozens of companies, technology solutions providers, human rights advocates, supply chain specialists, and other leaders and experts who contributed to this study believe there is a strong need to create more opportunities to partner directly with workers to drive the technology solutions agenda.

Ultimately, without greater engagement with and direct input from workers themselves, practitioners believe technology-driven opportunities to drive scale and impact on human rights in global supply chains will not be fully realized.

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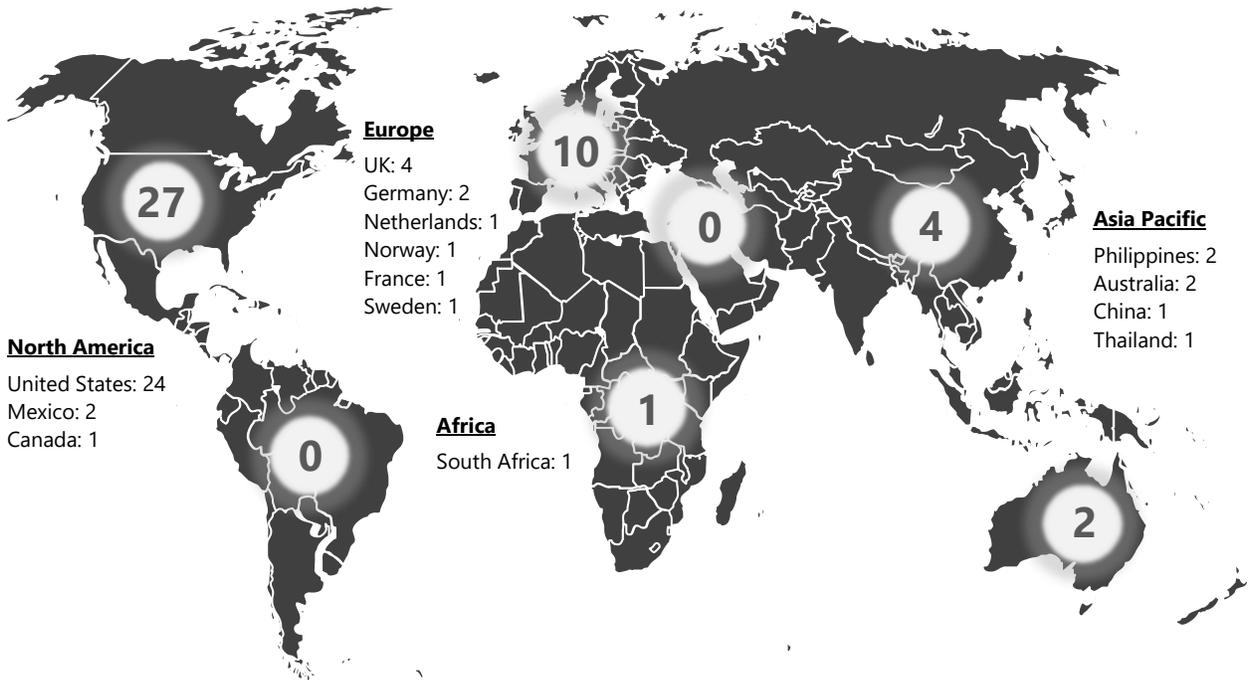
APPENDIX A: TECHNOLOGY PROFILES

Brief profiles are provided for each of the 44 technology solutions identified and included in this study. The authors of this study identified these technology solutions through literature review and interviews with practitioners, leaders, and experts in the technology, human rights, and supply chain field. While significant time and effort was put into identifying as many technology solutions as possible for this study, these technology solutions do not represent the entire universe of solutions that exist on the

market today. Furthermore, inclusion in this study, including those that are highlighted as examples in this report, does not mean an endorsement of these technology solutions by any of the organizations that funded or supported this study.

To learn more about the technology solutions included in this study, please visit their website or contact them directly.

Chart 4. Headquarters (HQ) of Technology Solutions, Total Count by Region



WORKER SOLUTIONS¹⁴

Name	Profile	Description
Contrados.org Website: contrados.org	<ul style="list-style-type: none"> • Other Users: None • HQ: Mexico City, Mexico • Year Launched: 2004 • Market Size: 430K users since 2004 	Contratados.org is a workers' rights initiative and peer-to-peer communication platform that enables workers along the Mexico-US migrant stream to share their experiences and review their recruiters and employers to prevent recruitment workplace abuses.
Coworker.org Website: coworker.org	<ul style="list-style-type: none"> • Other Users: None • HQ: Washington, D.C. • Year Launched: 2012 • Market Size: \$2.7M in annual revenue 	Coworker.org is an online platform that allows workers to start or join employee petitions, campaigns, or networks around workplace issues large and small, from improving an office breakroom to providing paid sick leave to employees.
Golden Dreams Website: issarainstitute.org	<ul style="list-style-type: none"> • Other Users: None • HQ: Bangkok, Thailand • Year Launched: 2014 • Market Size: Issara's core program reaches 100K+ migrant workers 	Golden Dreams is a Burmese-language mobile app for Burmese migrant workers in Thailand to learn and exchange information, reviews, ratings, comments, and advice about employers, recruiters, and service providers in both home and destination countries.
HourVoice Website: hourvoice.com	<ul style="list-style-type: none"> • Other Users: None • HQ: Chicago, IL • Year Launched: 2015 • Market Size: N/A 	HourVoice is a free, online tool for hourly workers to rate their employers, find better ones, track their hours, and learn about their rights. The anonymous information workers share helps other workers find good employers.
JORNALER@ App Website: ilr.cornell.edu	<ul style="list-style-type: none"> • Other Users: None • HQ: Cornell, NY • Year Launched: N/A • Market Size: N/A 	JORNALER@ App is an easy-to-use data collection and organizing tool to actively engage workers in wage theft prevention by simplifying record keeping. The app helps users track hours and wages across multiple jobs, sites, and employers.
My Labor Matters Website: mylabormatters.com	<ul style="list-style-type: none"> • Other Users: None • HQ: Manilla, Philippines • Year Launched: N/A • Market Size: N/A 	My Labor Matters is a multi-channel communication platform primarily for workers and jobseekers in the Philippine-Japan migration corridor. Workers and jobseekers use the tool to access and share information and report grievances.

¹⁴ Corresponding fiscal years for annual revenue data retrieved from Crunchbase.com are not specified. Total venture funding data, also retrieved from Crunchbase.com, are cumulative amounts as of the data retrieval date of May 2019. All amounts, unless otherwise indicated, are estimated values. LinkedIn Groups also was used to retrieve or further substantiate profile information.

<p>OFWwatch</p> <p>Website: ofwwatch.com</p>	<ul style="list-style-type: none"> • Other Users: None • HQ: Davao City, Philippines • Year Launched: 2006 • Market Size: N/A 	<p>OFWwatch is a mobile app and website that alerts overseas Filipino workers (OFW), in complete privacy, if an OFW nearby is in trouble, missing, or has been abused. The app recommends a course of action for users to take, such as contacting local authorities.</p>
<p>Outflank Pay Tracker</p> <p>Website: outflank.com.au</p>	<ul style="list-style-type: none"> • Other Users: None • HQ: New South Wales, Australia • Year Launched: 2013 • Market Size: N/A 	<p>Outflank Pay Tracker is a web-based personal payroll application that allows workers to accurately track their worked hours and expected pay. This provides a backup to the employer's error-prone payroll system to ensure that no underpayments occur.</p>
<p>Record My Hours App</p> <p>Website: fairwork.gov.au</p>	<ul style="list-style-type: none"> • Other Users: None • HQ: Australia • Year Launched: N/A • Market Size: N/A 	<p>Record My Hours App is a smartphone app that allows workers to record and store the hours they work, plus other information about their employment. Workers can retrieve this information instantly if an issue about their pay arises with their employer.</p>
<p>Worker Connect</p> <p>Website: workerconnect.org</p>	<ul style="list-style-type: none"> • Other Users: Suppliers • HQ: San Francisco, CA • Year Launched: 2012 • Market Size: \$13.1M in annual revenue 	<p>Worker Connect is a mobile-based app and dashboard for migrant construction workers to learn about their rights, share information about their experiences, and provide anonymous feedback to supervisors and employers.</p>
<p>WorkIt</p> <p>Website: workitapp.org</p>	<ul style="list-style-type: none"> • Other Users: None • HQ: Oakland, CA • Year Launched: 2016 • Market Size: N/A 	<p>WorkIt is an AI-powered mobile app that helps hourly workers (primarily Walmart workers) access information about workplace policies and rights from trusted and trained peer advisors. WorkIt also connects workers to one another to share experiences.</p>

SUPPLIER SOLUTIONS

Name	Profile	Description
Better Buying Website: betterbuying.org	<ul style="list-style-type: none"> • Other Users: Companies • HQ: Newark, DE • Year Launched: 2015 • Market Size: N/A 	Better Buying provides suppliers with a rating system and platform to communicate with companies about purchasing practices that honor safe working conditions and those that need improvement, without risking their business relationship.
Farmforce Website: farmforce.com	<ul style="list-style-type: none"> • Other Users: Companies; Workers • HQ: Oslo, Norway • Year Launched: N/A • Market Size: N/A 	Farmforce is a solution that simplifies the management of small-holder farmers, increases traceability, and enables access to formal markets. This SaaS-based solution enables users to manage outgrower schemes and contract farming programs.
Ganaz Website: ganaz.com	<ul style="list-style-type: none"> • Other Users: Workers • HQ: Seattle, WA • Year Launched: 2017 • Market Size: \$2.4M in total venture funding and \$1M in annual revenue 	Ganaz is a desktop- and mobile-based workforce management platform for the agriculture sector that addresses shared pain points between employers and workers. Ganaz is a communication tool that helps farmers recruit, retain, and engage their multilingual workforce.
Higg Facility Social & Labor Module (FSLM) Website: apparelcoalition.org	<ul style="list-style-type: none"> • Other Users: Companies • HQ: San Francisco, CA • Year Launched: 2016 • Market Size: N/A 	The Sustainable Apparel Coalition's Higg FSLM is a tool that enables manufacturing facilities to measure their social impacts across the value chain and assess the efficacy of social management programs. The Higg FSLM can be used for all manufacturing tiers.
QuizRR Website: quizrr.se	<ul style="list-style-type: none"> • Other Users: Workers; Companies • HQ: Stockholm, Sweden • Year Launched: 2013 • Market Size: SEK11M in total venture funding 	QuizRR digital training solutions are based on customized film dramas, followed by quiz questions. Workers use QuizRR to learn about employment rights and responsibilities and companies and suppliers use it to measure progress on worker training.
Responsible Remediation Resource (R3) Website: ther3.org	<ul style="list-style-type: none"> • Other Users: Companies • HQ: San Francisco, CA • Year Launched: 2019 • Market Size: N/A 	R3 is an IT-based, knowledge-management service that seeks to increase the level of remediation of labor issues in global supply chains. R3 provides country-specific and legally informed remediation guidance, elevates local knowledge and priorities, and reduces transaction costs and inefficiencies in collaboration.

COMPANY SOLUTIONS

Name	Profile	Description
&Wider Website: andwider.com	<ul style="list-style-type: none"> Other Users: Suppliers; Workers HQ: South Africa Year Launched: 2014 Market Size: N/A 	&Wider provides cost effective diagnostic tools that provides companies with real-time data and user-friendly analytics to support workers and suppliers. Workers' mobile phones are used to track and improve labor practices along the supply chain.
BanQu Website: banqu.co	<ul style="list-style-type: none"> Other Users: Workers HQ: Minneapolis, MN Year Launched: 2015 Market Size: \$2.6M in total venture funding 	BanQu is a blockchain-for-service software company that builds economic identities and connects people in extreme poverty to the global supply chains they participate in and the brands, organizations, and governments that power them.
BSI Supplier Compliance Manager (SCM) Website: bsigroup.com	<ul style="list-style-type: none"> Other Users: None HQ: London, UK Year Launched: N/A Market Size: £473.0M in annual revenue¹⁵ 	SCM is a web-based risk assessment and audit management solution that analyzes supplier risk and compliance using BSI's proprietary, global supply chain intelligence. SCM is used to quantify risk and compliance for programs, including Social Responsibility.
ChainPoint Supply Chain Solutions Website: chainpoint.com	<ul style="list-style-type: none"> Other Users: None HQ: Arnhem, Netherlands Year Launched: 2003 Market Size: \$310K in annual revenue 	ChainPoint is a customizable software platform for monitoring and securing supply chains. Companies use ChainPoint to manage and share product, process, and supplier information and improve quality and sustainability, while reducing cost and risk.
CUMULUS Forced Labor Screen Website: verite.org	<ul style="list-style-type: none"> Other Users: Suppliers HQ: Amherst, MA Year Launched: N/A Market Size: \$3.5M in annual revenue 	CUMULUS, by Verité, is an online platform for companies to cost effectively map, analyze, and prioritize forced labor risks introduced by the recruitment practices of their suppliers and their recruitment agents in both receiving and sending countries.
Descartes Labs Platform Website: descarteslabs.com	<ul style="list-style-type: none"> Other Users: None HQ: Santa Fe, NM Year Launched: 2014 Market Size: \$38.3M in total venture funding and \$1.5M in annual revenue 	Descartes Labs Platform is a machine learning-based API that collects, cleans, calibrates, stores, and catalogs data from public and commercial sources. The platform provides companies with computational power and tools to build near real-time predictive supply chain models and insights.

¹⁵ This figure represents BSI's total annual revenue in fiscal year 2017, not the revenue generated specifically by BSI's SCM. This figure, therefore, was not included in determining the estimates on Chart 2 of this report.

<p>DOL Mobile Applications</p> <p>Website: dol.gov</p>	<ul style="list-style-type: none"> • Other Users: Workers • HQ: Washington, D.C. • Year Launched: N/A • Market Size: N/A 	<p>DOL Mobile Applications consist of 8 mobile-based applications that companies use to access guidance on supply chain social compliance. Workers also use these apps to find jobs, gather safety and labor rights information, and track hours and pay.</p>
<p>EcoVadis Solutions</p> <p>Website: ecovadis.com</p>	<ul style="list-style-type: none"> • Other Users: Suppliers • HQ: Paris, France • Year Launched: 2007 • Market Size: 45K+ users and \$35M in annual revenue 	<p>EcoVadis is a SaaS platform that brings companies and suppliers together to efficiently drive CSR and sustainability performance through reliable CSR ratings and scorecards covering 21 CSR Indicators, 190 commodities, and 150 countries.</p>
<p>Enablon Supply Chain Software</p> <p>Website: enablon.com</p>	<ul style="list-style-type: none"> • Other Users: None • HQ: Chicago, IL • Year Launched: 2000 • Market Size: 1M+ users and \$41.1M in annual revenue 	<p>The Enablon Supply Chain software solution provides companies in 160 countries across all industries with a real-time view on their supply chains' performance and allows them to manage compliance and drive suppliers toward continuous improvement.</p>
<p>Laborlink</p> <p>Website: elevatelimited.com</p>	<ul style="list-style-type: none"> • Other Users: Suppliers; Workers • HQ: Oakland, CA • Year Launched: 2010 • Market Size: 2.5M workers reached 	<p>Laborlink uses mobile technology to enable companies and suppliers to connect directly with workers in real time. Laborlink delivers survey data through EiQ, an interactive platform to drive improvements in workplace safety, communication, and engagement.</p>
<p>LaborVoices</p> <p>Website: laborvoices.com</p>	<ul style="list-style-type: none"> • Other Users: Suppliers; Workers • HQ: Millbrae, CA • Year Launched: 2010 • Market Size: \$7.7M in annual revenue 	<p>LaborVoices is crowdsourced, supply chain intelligence created by workers via mobile technology and used by companies and factories to improve performance. LaborVoices also help workers make better decisions and avoid abusive situations.</p>
<p>MicroBenefits</p> <p>Website: microbenefits.com</p>	<ul style="list-style-type: none"> • Other Users: Suppliers; Workers • HQ: Shanghai, China • Year Launched: 2010 • Market Size: \$3.7M in annual revenue 	<p>MicroBenefit's CompanyIQ is a mobile-based, game-style app that provides workers, suppliers, and companies with a suite of solutions, from worker voice tools to digital learning platforms. The app has reached 1M+ workers since its launch.</p>
<p>Orbital Insight</p> <p>Website: orbitalinsight.com</p>	<ul style="list-style-type: none"> • Other Users: None • HQ: Mountain View, CA • Year Launched: 2013 • Market Size: \$78.7M in total venture funding and \$1.5M in annual revenue 	<p>Orbital Insight's cloud-based software combines and interprets data from the commercial space industry and relevant terrestrial sources to deliver new insights to companies. Through AI and ML, petabytes of data are distilled to increase decision-making confidence and reduce time-to-action.</p>

Phylagen	<ul style="list-style-type: none"> • Other Users: Suppliers • HQ: San Francisco, CA • Year Launched: 2014 • Market Size: \$14M in total venture funding and \$3M in annual revenue 	Phylagen combines the most advanced DNA sequencing technology with artificial intelligence to compare naturally-occurring, invisible microbes (“fingerprints”) and verify the origin of products across global supply chains—bringing a new level of insight and transparency to companies and suppliers.
Website: phylagen.com		
Provenance	<ul style="list-style-type: none"> • Other Users: None • HQ: London, UK • Year Launched: 2014 • Market Size: \$1.1M in total venture funding 	Powered by blockchain and open data, Provenance’s digital platform gathers and shares key product information and journeys that is secure, trustworthy, and accessible. Companies use Provenance to build trust and transparency with their customers.
Website: provenance.org		
RADAR Database	<ul style="list-style-type: none"> • Other Users: Workers • HQ: Mexico City, Mexico • Year Launched: 2005 • Market Size: N/A 	The RADAR database platform focuses on the rights of migrant workers in the United States, primarily from Mexico. Workers and key actors report labor and human rights violations and companies are provided viable alternatives for ethical recruitment.
Website: prodasc.org.mx		
RADIX Tree	<ul style="list-style-type: none"> • Other Users: Suppliers • HQ: Mannheim, Germany • Year Launched: 2010 • Market Size: 80K+ companies represented on platform 	RADIX Tree is an online platform for connecting and sharing supply chain data. RADIX Tree provides companies and suppliers with greater visibility over raw materials and enable efficient due diligence to comply with regulation, such as the EUTR.
Website: global-traceability.com		
Responsible Sourcing Tool	<ul style="list-style-type: none"> • Other Users: None • HQ: Boston, MA • Year Launched: N/A • Market Size: N/A 	Hosted by Verité, the Responsible Sourcing Tool is an online platform that provides companies with resources and best practices on policy development, screening, and compliance. It also includes a risk mapping tool by industry and commodity.
Website: responsiblesourcingtool.org		
Sedex Advance	<ul style="list-style-type: none"> • Other Users: Suppliers • HQ: London, UK • Year Launched: 2004 • Market Size: 50K+ members and \$10M in annual revenue 	Sedex Advance is a collaborative platform for companies, suppliers, and auditors to store, share, and report on supply chain information. Ethical data can be tracked through a reporting platform to manage and demonstrate progress.
Website: sedexglobal.com		
Sourcemap	<ul style="list-style-type: none"> • Other Users: None • HQ: New York, NY • Year Launched: 2008 • Market Size: \$3.5M in annual revenue 	Sourcemap is a desktop and mobile software solution that provides supply chain data collection, visualization, verification, and reporting functionalities. Companies use Sourcemap to map their supply chains and improve transparency and traceability.
Website: sourcemap.com		

<p>SupplyShift</p> <p>Website: supplyshift.net</p>	<ul style="list-style-type: none"> • Other Users: Suppliers • HQ: Santa Cruz, CA • Year Launched: 2012 • Market Size: \$3.8M in total venture funding and \$2M in annual revenue 	<p>SupplyShift is a secure, cloud-based enterprise supply chain management platform to reduce risk and enhance supply chain responsibility. Companies analyze supplier information and suppliers receive insights on how they compare with industry peers and how to improve performance.</p>
<p>Sustainabill</p> <p>Website: sustainabill.io</p>	<ul style="list-style-type: none"> • Other Users: None • HQ: Cologne, Germany • Year Launched: 2017 • Market Size: N/A 	<p>Sustainabill is a cloud-based solution that helps companies focus on supply chain analytics and mapping and achieve multi-tier visibility for their products. Sustainabill provides comprehensive sustainability KPIs for products and materials.</p>
<p>TIMBY</p> <p>Website: timby.org</p>	<ul style="list-style-type: none"> • Other Users: Suppliers; Workers • HQ: Montreal, Canada • Year Launched: 2014 • Market Size: N/A 	<p>TIMBY helps users connect on-the-ground data to impact for everything from reducing corruption to cleaning up supply chains. It includes a mobile app for collecting geo-referenced reports and a dashboard to aggregate, store, and analyze reports.</p>
<p>Trace Register</p> <p>Website: traceregister.com</p>	<ul style="list-style-type: none"> • Other Users: Suppliers • HQ: Seattle, WA • Year Launched: 2005 • Market Size: \$250K in total venture funding and \$9.4M in annual revenue 	<p>Trace Register is a secure, web-based database offering electronic traceability for food supply chains. It provides secure product registration, unique product level identification, confidential on-line data management, and immediate compliance with food traceability standards.</p>
<p>Transparency-One</p> <p>Website: transparency-one.com</p>	<ul style="list-style-type: none"> • Other Users: Suppliers • HQ: Boston, MA • Year Launched: 2015 • Market Size: N/A 	<p>Transparency-One enables companies to analyze all suppliers, components, and facilities from source to store. It helps map entire supply chains, track compliance, and manage business risks. Blockchain heightens the security of data stored in the platform.</p>
<p>Ulula</p> <p>Website: ulula.com</p>	<ul style="list-style-type: none"> • Other Users: Suppliers; Workers • HQ: New York, NY • Year Launched: 2013 • Market Size: \$1M in total venture funding and \$3.5M in annual revenue 	<p>Ulula is a multi-language, customizable supply chain management software that helps companies and suppliers connect with workers, gather worker feedback, engage stakeholders in real time (via SMS, voice, social media, or messenger apps), and obtain actionable insights and early warnings.</p>
<p>Verisk Due Diligence Solutions</p> <p>Website: maplecroft.com</p>	<ul style="list-style-type: none"> • Other Users: None • HQ: Bath, UK • Year Launched: 2001 • Market Size: \$20M in annual revenue 	<p>Verisk Maplecroft Human Rights Due Diligence solutions provide companies with risk indices and datasets across 31 human rights indices that can be integrated via APIs with internal risk managements systems, third-party platforms, and ESG models.</p>

APPENDIX B: TABLES

The tables on the following pages provide information based on the authors' assessment of self-declared information and reported use cases. While this information has not been validated directly with the technology solutions providers, it should provide a reasonable approximation of what is publicly reported by these technology solutions providers.

Any errors, omissions, or misinterpretations are those of the authors of this report.

All feedback and data validations are welcome and should be sent to the Human Rights and Business Initiative at jnishinaga@berkeley.edu under the subject of "Technology, Human Rights, and Supply Chain Report Feedback."

Table 3. Technology Solutions by User and Type

Technology Solution	User			Type			
	Worker 	Supplier 	Company 	Desktop 	Mobile 	Blockchain 	AI / ML 
&Wider	✓	✓	✓	✓	✓		
BanQu	✓		✓	✓	✓	✓	
Better Buying		✓	✓	✓			
BSI Supplier Compliance Manager			✓	✓			
ChainPoint Supply Chain Solutions			✓	✓			
Contratados.org	✓			✓			
Coworker.org	✓			✓			
CUMULUS (Verité)		✓	✓	✓			
Descartes Labs Platform			✓				✓
DOL Mobile Applications	✓		✓		✓		
EcoVadis Solutions		✓	✓	✓			
Enablon Supply Chain Software			✓	✓			
Farmforce	✓	✓	✓	✓	✓		
Ganaz	✓	✓			✓		
Golden Dreams	✓				✓		
Higg Facility Social & Labor Module		✓	✓	✓			
HourVoice	✓				✓		
JORNALER@ App	✓				✓		
Laborlink	✓	✓	✓	✓	✓		
LaborVoices	✓	✓	✓	✓	✓		
MicroBenefits	✓	✓	✓	✓	✓		
My Labor Matters	✓			✓	✓		
OFWwatch	✓			✓	✓		
Orbital Insight			✓				✓
Outflank Pay Tracker	✓			✓	✓		
Phylagen		✓	✓				✓
Provenance			✓	✓	✓	✓	
QuizRR	✓	✓	✓	✓			
RADAR Database	✓		✓	✓			
RADIX Tree		✓	✓	✓			
Record My Hours App	✓				✓		
Responsible Remediation Resource		✓	✓	✓			
Responsible Sourcing Tool			✓	✓			
Sedex Advance		✓	✓	✓			
Sourcemap			✓	✓		✓	
SupplyShift		✓	✓	✓			
Sustainabill			✓	✓			
TIMBY	✓	✓	✓	✓	✓		
Trace Register		✓	✓	✓			
Transparency-One		✓	✓	✓	✓	✓	
Ulula	✓	✓	✓	✓	✓		
Verisk Due Diligence Solutions			✓	✓			
Worker Connect	✓	✓		✓	✓		
WorkIt	✓				✓		✓

Table 4. Technology Solutions by Worker Objective

	Access to Remedy	Access to Information	Worker Voice	Peer-to-Peer Feedback	Hours or Pay Tracking	Job Search & Employer Review
&Wider			√			
BanQu			√			
Better Buying						
BSI Supplier Compliance Manager						
ChainPoint Supply Chain Solutions						
Contratados.org			√	√		√
Coworker.org			√	√		
CUMULUS (Verité)						
Descartes Labs Platform						
DOL Mobile Applications	√					
EcoVadis Solutions						
Enablon Supply Chain Software						
Farmforce		√	√			
Ganaz		√	√			
Golden Dreams	√	√		√		√
Higg Facility Social & Labor Module						
HourVoice					√	√
JORNALER@ App	√			√	√	
Laborlink			√			
LaborVoices			√			
MicroBenefits	√	√	√	√	√	
My Labor Matters	√	√	√	√		
OFWwatch	√	√	√	√		
Orbital Insight						
Outflank Pay Tracker	√				√	
Phylagen						
Provenance						
QuizRR		√	√			
RADAR Database	√	√				
RADIX Tree						
Record My Hours App	√				√	
Responsible Remediation Resource						
Responsible Sourcing Tool						
Sedex Advance						
Sourcemap						
SupplyShift						
Sustainabill						
TIMBY	√	√	√	√		
Trace Register						
Transparency-One						
Ulula	√	√	√			
Verisk Due Diligence Solutions						
Worker Connect	√	√	√			
WorkIt		√	√	√		

Table 5. Technology Solutions by Supplier Objective

	Supplier-Buyer Data Exchange	Self-Assessment & Performance Measurement	Worker Communication	Worker Survey & Feedback	Worker Recruitment & Retention
&Wider			√	√	
BanQu					
Better Buying	√				
BSI Supplier Compliance Manager					
ChainPoint Supply Chain Solutions					
Contratados.org					
Coworker.org					
CUMULUS (Verité)	√	√			
Descartes Labs Platform					
DOL Mobile Applications					
EcoVadis Solutions	√	√			
Enablon Supply Chain Software					
Farmforce	√	√	√	√	
Ganaz			√		√
Golden Dreams					
Higg Facility Social & Labor Module		√			
HourVoice					
JORNALER@ App					
Laborlink			√	√	
LaborVoices			√	√	
MicroBenefits	√	√	√	√	√
My Labor Matters					
OFWwatch					
Orbital Insight					
Outflank Pay Tracker					
Phylagen		√			
Provenance					
QuizRR		√	√	√	√
RADAR Database					
RADIX Tree	√				
Record My Hours App					
Responsible Remediation Resource	√	√	√		√
Responsible Sourcing Tool					√
Sedex Advance	√	√			
Sourcemap					
SupplyShift	√	√			
Sustainabill					
TIMBY			√		
Trace Register	√				
Transparency-One		√			
Ulula			√	√	
Verisk Due Diligence Solutions					
Worker Connect			√		
WorkIt					

Table 6. Technology Solutions by Company Objective

	Risk Analysis & Due Diligence	Supplier Audit & Compliance	Mapping & Visualization	Product Traceability	Predictive Analytics & Forecasting	Consumer Engagement
&Wider	√	√	√			
BanQu		√		√		
Better Buying	√					
BSI Supplier Compliance Manager	√	√	√			
ChainPoint Supply Chain Solutions	√	√	√	√		
Contratados.org						
Coworker.org						
CUMULUS (Verité)	√	√	√			
Descartes Labs Platform					√	
DOL Mobile Applications		√				
EcoVadis Solutions	√	√				
Enablon Supply Chain Software	√	√	√			
Farmforce		√		√		
Ganaz						
Golden Dreams						
Higg Facility Social & Labor Module	√					
HourVoice						
JORNALER@ App						
Laborlink	√	√	√			
LaborVoices	√	√				
MicroBenefits	√	√				
My Labor Matters						
OFWwatch						
Orbital Insight					√	
Outflank Pay Tracker						
Phylagen				√		
Provenance				√		√
QuizRR	√					
RADAR Database	√					
RADIX Tree	√	√	√	√		
Record My Hours App						
Responsible Remediation Resource	√	√				
Responsible Sourcing Tool	√	√	√			
Sedex Advance	√					
Sourcemap	√		√	√		
SupplyShift	√	√		√		
Sustainabill	√	√	√	√		
TIMBY	√		√			√
Trace Register	√	√		√		
Transparency-One	√	√	√	√		√
Ulula	√	√				
Verisk Due Diligence Solutions	√	√				
Worker Connect						
WorkIt						

APPENDIX C: REFERENCES

1. Anita Househam, Elisabeth Anna Resch, Pia Haslauer, and Angie Hyo Jung Kim, "[Decent Work in Global Supply Chains: A Baseline Report](#)," UN Global Compact, September 2018.
2. Antoine Heuty, "[How 'Responsible Supply Tech' is Helping Tackle Modern Slavery and Human Trafficking](#)," Freedom Fund, February 2018.
3. Dr. Başak Bağlayan, Ingrid Landau, Marisa McVey, and Kebene Wodajo, "[Good Business: The Economic Case for Protecting Human Rights](#)," International Corporate Accountability Roundtable (ICAR), Frank Bold, and the Business and Human Rights (BHR) Young Researchers Summit, December 2018.
4. Davide Fiedler, "[Is technology a game-changer for human rights in corporate value chains](#)," World Business Council for Sustainable Development, November 2018.
5. Dean Pinkert, James Ton-that, and Ravi Soopramanien, "[Blockchain technologies offer transparency that could improve human rights practices](#)," OpenGlobalRights, January 2019.
6. DLA Piper, Everledger, Hermes EOS, and RCS Global, "[Discussion Paper: Supply Chain Human Rights Risk Management](#)," November 2018.
7. Dunstan Allison-Hope, Hannah Darnton, and Peter Nestor, "[Announcing a New Collaboration Using Tech to Combat Human Trafficking](#)," BSR, June 2018.
8. Ed Marcum and Ryan Heman, "[Opportunities and Tradeoffs: Our Commitment to Empower Workers through Responsible Supply Chain Tech](#)," Humanity United, November 2018.
9. Farbenblum, Berg, and Kintominas, "[Transformative Technology for Migrant Workers: Opportunities, Challenges, and Risks](#)," Open Society Foundations, November 2018.
10. Global e-Sustainability Initiative, "[EnablingRights - The Transformative Potential of Digital to Enable People's Rights](#)," 2018.
11. ILO, "[Global Estimates of Modern Slavery: Forced Labour and Forced Marriage](#)," September 2017.
12. ILO, "[ILO global estimates on migrant workers](#)," December 2015.
13. KnowTheChain, "[Three Sectors, Three Years Later: Progress and Gaps in the Fight Against Forced Labor](#)," April 2019.
14. Lisa Newman-Wise, Caitlin Ryan, and Tony Siesfeld, "[Responsible Supply Chain Tools: Understanding the Market Opportunity](#)," The Monitor Institute by Deloitte, April 2019.
15. Luis González Morales and Tom Orrell, "[Data Interoperability: A Practitioner's Guide to Joining Up Data in the Development Sector](#)," October 2018.
16. Nithin Coca, "[Technology is failing to create transparent supply chains](#)," Engadget, July 2017.

17. Sara Saberi, Mahtab Kouhizadeh, Joseph Sarkis, and Lejia Shen, "[Blockchain technology and its relationships to sustainable supply chain management](#)," International Journal of Production Research, October 2018.
18. Sean Morris, Jonathan R. Copulsky, David Linich, and Nes Parker, "[Supply unchained: Fighting labor abuse in your supply chain](#)," Deloitte Insights, July 2014.
19. Shannon K. O'Neil, "[Unfinished Business: Improving Labor Standards in Global Supply Chains](#)," Council on Foreign Relations, November 2016.
20. Shift, "[From Audit to Innovation: Advancing Human Rights in Global Supply Chains](#)," New York, August 2013.
21. Tara Norton, "[The Supply Chain Leadership Ladder: A Maturity Model for Supply Chain Sustainability](#)," BSR, January 2017.
22. The Walt Disney Company, Humanity United, and the C&A Foundation, "[Are emerging technology innovations driving better access to remedy in global supply chains](#)," United Nations Forum on Business and Human Rights, November 2017.
23. Toby Webb, Sean Ansett, Kilian Moote, and Jessi Baker, "[Can supply chain technology deliver improved human rights](#)," Innovation Forum Podcast, September 2016.
24. Wilton Park, "[The role of digital technology in tackling modern slavery](#)," June 2017.

APPENDIX D: ENGAGEMENT DOCUMENTS

Companies and suppliers have a significant role to play in respecting human rights in global supply chains. The following pages contain pull-out documents for companies, suppliers, and technology solutions providers to use to explore and identify technology solutions that will

benefit them and, ultimately, create positive human rights impacts for supply chain workers.

These documents are meant to be illustrative and should be further tailored based on the user's specific circumstances and needs.

COMPANY ENGAGEMENT DOCUMENT

Companies are expected to address human rights abuses in their supply chains, from human trafficking and forced and child labor to hazardous working conditions, physical abuse and sexual violence, and insufficient wages.

Technology has emerged as a useful tool to address human rights challenges in global supply chains. Companies have an opportunity to incorporate technology solutions that will help them with:

- Human rights risk assessment and due diligence
- Mapping and visualization of human rights risks
- Supplier audit and compliance management
- Product traceability
- Predictive analytics and forecasting
- Consumer engagement (e.g., providing human rights-related information to customers or consumers)



Benefits to business:

- Meet existing and emerging legal and reporting requirements
- Minimize business and supply chain disruptions
- Protect company's reputation and brand value
- Meet investors' and stakeholders' expectations
- Create efficiency across supply chains
- Meet evolving customer and business partner requirements
- Innovate for changing market

Source: [UN Global Compact](#)



QUESTIONS TO EXPLORE WITH COMPANIES

1. Why is a focus on human rights important to your company and your supply chain?
2. What specific human rights challenges are most significant in your supply chain?
3. How can different functions across your company help address these human rights challenges?
4. How can technology help address these human rights challenges?
5. What specific barriers might prevent your company from implementing new technologies?
6. What information do you need to provide different functions across your company to obtain their buy-in on any efforts to implement new technologies?



NEXT STEPS FOR COMPANIES

- Define your company's most material supply chain human rights issues.
- Identify corporate functions or units that influence supply chain decisions and outcomes.
- Engage with these corporate functions using the questions provided in this document.
- Using this report, research technology solutions that could address key barriers and pain points.
- Identify 2 to 3 technology solutions and explore whether and how they will bring economic and social value to your company, suppliers, and, most importantly, workers in your supply chain.
- If potentially beneficial solutions are identified, pitch these potential solutions to key decision-makers and agree on which solution(s) to adopt.

SUPPLIER ENGAGEMENT DOCUMENT

Suppliers are expected to address human rights abuses in their operations, from human trafficking, physical abuse, and sexual violence to hazardous working conditions and insufficient wages.

Technology has emerged as a useful tool to address human rights challenges in global supply chains. Suppliers have opportunities to incorporate technology solutions to address these challenges, but also to provide the right incentives or conditions that will enable their workers to meet their needs.



Technology assists suppliers with:

- Data collection and exchange
- Self-assessments on human rights policies and practices
- Measuring performance (e.g., outcomes and impact) on human rights
- Worker communication and engagement
- Worker surveys and feedback
- Worker recruitment and retention



Technology assists workers with:

- Facilitating access to effective remedies
- Reporting grievances and actual or potential human rights violations
- Accessing critical information about their rights
- Communicating and sharing experiences with peers
- Tracking working hours or pay
- Reviewing or rating employers
- Searching for jobs and accessing worker-generated job or employer reviews



QUESTIONS TO EXPLORE WITH SUPPLIERS

1. What human rights challenges are most significant in your operations and with your employees, temporary workers, or contractors? Why?
2. What measures have you taken to address these challenges?
3. How have these measures improved your workers' human rights? How have these measures fallen short of their intended impact?
4. How can technology help address these human rights challenges?
5. What specific barriers might prevent your organization from implementing new technologies?
6. How can workers be properly trained to ensure new technologies will help meet their needs?



NEXT STEPS FOR SUPPLIERS

- Identify key groups and individuals within your organization who have direct influence on decisions or actions that could impact the human rights of workers.
- Engage with these groups and individuals using the questions provided in this document.
- Using this report, research technology solutions that could address key barriers and pain points.
- Identify 2 to 3 technology solutions and explore whether and how they will bring economic and social value to your organization and your workers.
- If potentially beneficial solutions are identified, pitch these potential solutions to key decision-makers and agree on which solution(s) to adopt.

HUMAN RIGHTS CENTER
UC BERKELEY SCHOOL OF LAW
2224 PIEDMONT AVENUE
BERKELEY, CA 94720
510.642.0965

WWW.HUMANRIGHTS.BERKELEY.EDU
HRC@BERKELEY.EDU
MEDIUM.COM/HUMANRIGHTSCENTER
 [@HRCBERKELEY](https://twitter.com/HRCBERKELEY)