Discussion Paper

SUPPLY CHAIN HUMAN RIGHTS RISK MANAGEMENT:
BLOCKCHAIN AND EMERGING TECHNOLOGY

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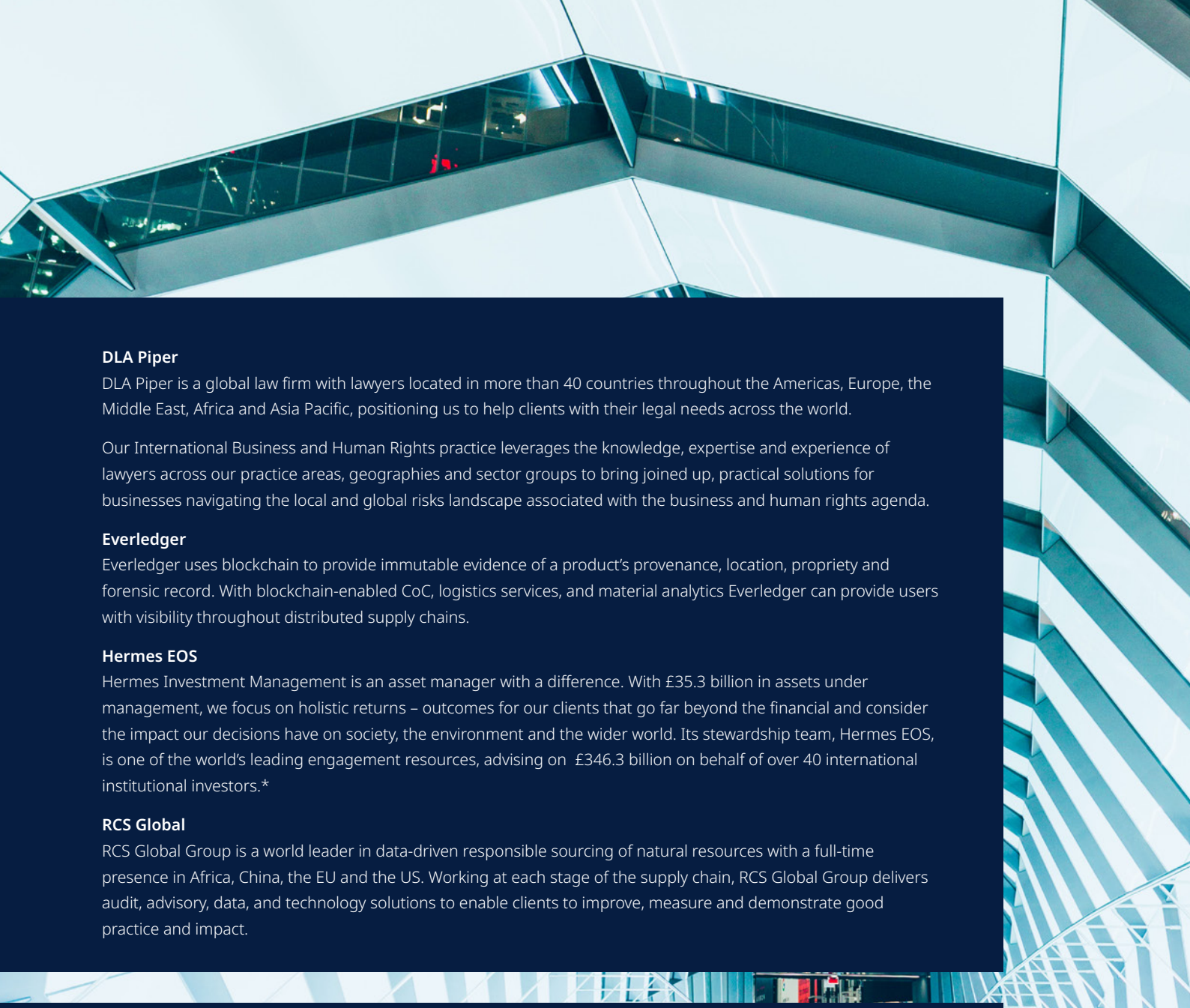
EVERLEDGER



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Our International Business and Human Rights practice leverages the knowledge, expertise and experience of lawyers across our practice areas, geographies and sector groups to bring joined up, practical solutions for businesses navigating the local and global risks landscape associated with the business and human rights agenda.

Everledger
Everledger uses blockchain to provide immutable evidence of a product's provenance, location, propriety and forensic record. With blockchain-enabled CoC, logistics services, and material analytics Everledger can provide users with visibility throughout distributed supply chains.

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Hermes Investment Management is an asset manager with a difference. With £35.3 billion in assets under management, we focus on holistic returns – outcomes for our clients that go far beyond the financial and consider the impact our decisions have on society, the environment and the wider world. Its stewardship team, Hermes EOS, is one of the world's leading engagement resources, advising on £346.3 billion on behalf of over 40 international institutional investors.*

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RCS Global Group is a world leader in data-driven responsible sourcing of natural resources with a full-time presence in Africa, China, the EU and the US. Working at each stage of the supply chain, RCS Global Group delivers audit, advisory, data, and technology solutions to enable clients to improve, measure and demonstrate good practice and impact.

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*Source: Please note the total AUM figure includes £6.2bn of assets managed or under an advisory agreement by Hermes GPE LLP ("HGPE"), a joint venture between Hermes Fund Managers Limited ("HFM") and GPE Partner Limited. HGPE is an independent entity and not part of the Hermes group. £146.9m of total group AUM figure represents HFM mandates under advice. Source: Hermes as at 30 June 2018 with the exception of two portfolios totalling £2.6m valued as at 31 May 2018.

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Introduction

Global businesses are faced with an increasingly complex and interconnected legal, financial and reputation risk agenda related to involvement in human rights and other responsible business conduct risks like conflict financing, financial crime, modern slavery and trafficking and environmental harm. Corporate stakeholders, including employees, consumers, investors and communities are also demanding greater transparency from businesses in relation to their activities, supply chains and business relationships. This creates challenges for businesses as they seek to navigate legal and commercial risks whilst also balancing stakeholders' expectations with respect to human rights.

Alongside these trends, technological innovations are transforming the way businesses increase transparency, manage risks and create value. Distributed Ledger Technology ("**DLT**"), commonly known as blockchain technology, is behind a wave of innovation that has the potential to revolutionise the way global businesses operate across a range of sectors.

Framed around investors' views on human rights risk management and supply chain transparency and focusing on examples from minerals and metals supply chains, this discussion paper outlines some of the potential opportunities and challenges presented by DLT to manage human rights and responsible business conduct risks in supply chains and increase transparency. Whilst this technology presents unique and promising opportunities, practical challenges remain that can be addressed using a range of technology, commercial and legal solutions. Many of the insights presented in this paper are also applicable across other sectors and supply chains.

"Human rights violations in supply chains could expose companies to material reputational, operational and regulatory risks, such as severe brand damage and negative impact on operations, such as strikes. Although investors acknowledge that transparency and data collection continue to be a challenge, companies are expected to carry out comprehensive due diligence, provide remedy and participate in collective initiatives to collaborate on scalable solutions. Technology has the potential to contribute to how businesses reduce negative human rights impacts and generate positive impact. Investors can play a role in encouraging companies to work more collaboratively on these topics, and conduct due diligence to prevent or address adverse or negative human rights impacts."

— Fiona Reynolds, CEO
Principles for Responsible Investment

This discussion paper is the result of stakeholder consultations with businesses, investors, advisors and technology providers. Engagement with these stakeholders will continue over coming months and we welcome stakeholders from civil society, regulatory and industry bodies and international organizations to further explore how emerging technologies can support supply chain management.

If you would like to comment on this discussion paper please email bizhumanrights@dlapiper.com

In this discussion paper we look at:

Why Do Investors Care?

On 13 September 1970, the renowned Nobel Prize winning economist Milton Friedman published an article "*The Social Responsibility of Business is to Increase its Profits*".[1] Through the decades that followed, this article was quoted and used time and time again for both sides of the argument, for and against whether legal persons, such as corporates, should promote social ends as an integral part of their business activities or whether maximising financial returns for shareholders is their sole responsibility.

The above sets the scene for the "*supply-side*" of corporate social responsibilities ("**CSR**"), which has more recently evolved into the concept of "*responsible business conduct*", and the progress that followed. On the *"demand-side"* of the equation, some refer to a different acronym – environmental, social and governance ("**ESG**") issues.

Many investors argue that a turning point that has triggered a shift from "*maximising financial return",* to *"optimising total returns, including financial, environmental and social returns with a positive impact on society*" was the 2008 Great Financial Crisis ("**GFC**"). Institutional investors were heavily criticised for failing to act as a responsible owner and financier of businesses. From governments to the media, there were more robust discussions on how institutional investors (including a number who typically invest on behalf of current and future pensioners) should fulfil their fiduciary responsibilities.

The publication of the first stewardship code, the UK Stewardship Code,[2] in 2010 represents a milestone in the shake-up of corporate governance in the UK following the GFC. Institutional investors are expected to be responsible stewards of investee companies and have responsibilities to monitor companies' performance as well as boardroom behaviour. Institutional investors are also expected to have clear guidelines on when and how they escalate their activities to protect and enhance shareholder value. In September 2018, the UK government published a consultation response that clarifies and strengthens trustees' investment duties. The regulation around fiduciary duty will be updated to clarify that pension trustees must consider financially material ESG risks and opportunities.[3]

In recent years, ESG has increasingly become a mainstream investor consideration rather than one which historically has been a focus of socially responsible investors. For example, in early 2018, Blackrock, the world's largest asset manager with more than US$6 trillion in assets under management, made it clear that society is demanding that companies *"must not only deliver financial performance, but also show how it makes a positive contribution to society"*.[4]

Underscoring these trends is a growing body of empirical research that shows companies with better ESG standards record stronger financial performance and beat benchmarks,[5] or that companies with more ethical operations make bigger profits.[6]

Increasingly, investors look to ESG risk management and impact generation as a way to encourage positive changes in corporate behaviour, which leads to improved performance. Using key global standards like the UN Guiding Principles on Business and Human Rights ("**UNGP**") and the UN Sustainable Development Goals ("**SDGs**") as guiding frameworks reveals some themes that could yield the most desired impact, including both risk mitigation outcomes and intentional positive impact due to a change in corporate behaviour, such as responsible sourcing policies and practices.

Hermes Equity Ownership Services ("Hermes EOS") aims to protect the value of our clients' assets by engaging in the long-term risks that affect the long-term growth and profitability of the companies they own. We engage with companies on issues including but not limited to anti-bribery and corruption, human capital management, human rights, climate change and resource efficiency. Legislative developments like the UK Modern Slavery Act (2015) and 1502 Dodd-Frank Act (2010) have raised the importance of supply chain management. However, attaining complete transparency of the end-to-end supply chain, is still work in progress. On the other hand, academic research has shown that improvements in supply chain management has the highest potential for environmental and social impact, supporting sustainable development, which explains why this is one area of our engagement focus.[7]

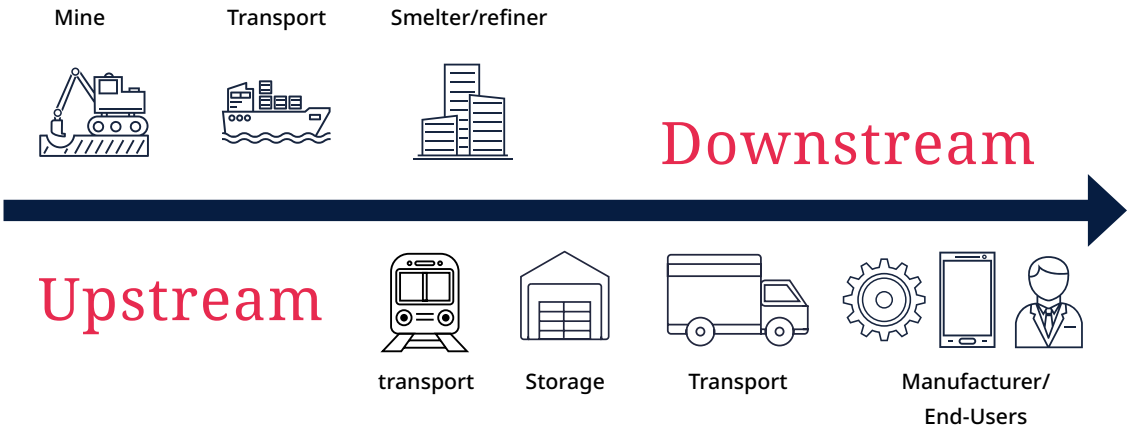
The Challenge Of Transparency

Focus on Minerals and Metals Supply Chains

Minerals and metals supply chains often extend to areas where there is a higher risk of adverse human rights impacts, for instance, conflict-affected and high-risk areas, weak governance zones, countries included on international sanctions lists and countries where monitoring and enforcement of relevant laws are known to be weak or absent.

Heightened local risk checklist:

- Conflict affected areas or post-conflict zones
- Widespread violence and active criminal networks
- Political instability or repression
- Weak governance zones where monitoring and enforcement of laws are weak or absent
- Areas affected by sanctions
- Public and private sector corruption
- Restrictions or limitations on civil society and human rights defenders
- Widespread human rights abuses or violations of international law



As global businesses and investors are faced with an increasingly complex and interconnected legal, financial and reputation risk agenda related to involvement in human rights and other responsible business conduct risks, stakeholders are looking to hold downstream companies, brands and their investors to account for abuses occurring throughout a supply chain. This heightens the imperative to improve traceability of minerals and metals through a supply chain.

In May 2018, Hermes EOS attended the OECD's 12th Forum on Responsible Mineral Supply Chains in Paris. The forum gave its attendees an opportunity to engage with stakeholders from miners to smelters and refiners, local communities, non-government organisations, government organisations from Africa's Great Lakes region, as well as global technology, consumer and automobile companies.

Key lessons:

(a) existing due diligence processes do not fully address human rights issues at all mines;

(b) managing supply chains is part of risk management and that the root cause of child labour is poverty;

(c) the employment status of miners in cooperatives requires further debate and investigation.[8]

Traceability

Traceability is the ability to prove Chain of Custody (**"CoC"**). While different types of CoC systems exist, a common objective of these systems is to enable data to be collected relating to provenance and material stewardship along a supply chain; the source, and the methods and practices employed during production, processing and transport. This data is an essential component of ensuring risks are effectively identified and management systems are able to respond.

However, challenges exist within minerals and metals supply chains that can make traceability, data collection and robust human rights risk management difficult.

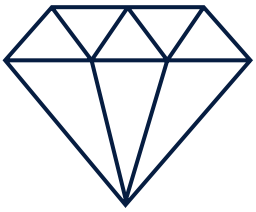
What is the difference between traceability and Chain of Custody?

Traceability: The ability to verify the history, location, or application of an item by means of documented recorded identification.

Chain of Custody: "*The custodial sequence that occurs as ownership or control of the material supply is transferred from one custodian to another in the supply chain*". (Adapted from World Bank/World Wildlife Fund Alliance for Forest Conservation and Sustainable Use, 2002). Documenting CoC describes the list of all organisations (supply chain) that take ownership or control of a product during production, processing, shipping and retail (physically and/or administratively).

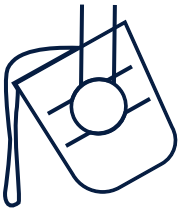
Source. ISEAL Glossary

Commodity-centered challenges



The ease with which commodities can be physically traced through a supply chain will depend on their form. Hard commodities, metals and minerals on the one hand to soft commodities like agricultural products on the other, vary greatly in their physical form and uniqueness.

For some minerals like diamonds, there is less variation in physical form as it moves through a supply chain when compared with other metals and minerals, such as cobalt, that are processed or blended to suit customer requirements.



Blending and processing of minerals and concentrates from different sources into the same process can make it harder to collect consistent and reliable local data relating to, for example, human rights and labour conditions at a mine site or in the pre-smelter transportation. For most metals, initial processing generally takes place at or near the mine site to reduce transportation costs, however where this is not the case data collection from initial upstream activities can be even more challenging.

Many commodity supply chains are increasingly dispersed and characterised by commodities traders' practices of buying and selling and arbitrage techniques, which can be employed to reduce transportation costs or account for prices fluctuation. This means supply chains are less vertical and a commodity that was originally sourced for a particular end user may not end up being supplied to that end user. This raises similar challenges in relation to data collection.

Compliance-driven challenges

Existing audit and top-down management systems have their place in a well through out system, but may need to be supplemented to ensure that they are truly effective and practically workable for suppliers and business partners along a supply chain.

REQUESTS FOR INFORMATION AND DIVERGING STANDARDS

Compliance demands from downstream companies, brands and their investors see requests for specific data relating to human rights risks fall on miners, smelters, refiners and traders. These upstream stakeholders are required to provide this information according to different requests and standards based on different compliance systems. Most CoC systems are still paper-based, increasing counterparty and fraud risks.

In addition, each business has differing policies on how they address non-compliance uncovered in their supply chain. The lack of universal standards or approach for CoC systems, meaning standards vary across, and within, commodity supply chains, presents challenges both for upstream suppliers who may have to comply with a number of diverging standards and for downstream purchasers and investors who cannot always make informed decisions by comparing like with like.

GAPS IN DATA COLLECTION

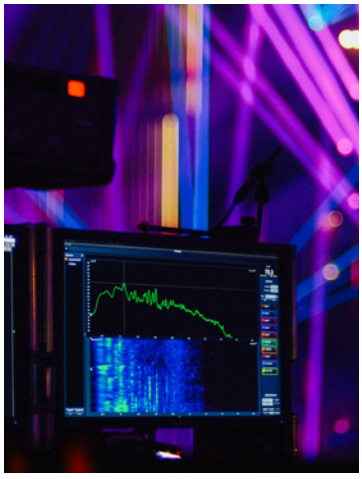
Many supply chain due diligence processes find it challenging to collect adequate data on risks upstream of processing and smelting. For example, the five-step framework of the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas provides useful guidance on establishing management systems and addressing risks in all mineral supply chains and in all geographies. However, stakeholders have identified the need for further tools to support the identification of these risks in the supply chain, especially at local or country level.

As a result issues like labour exploitation, including child labour, modern slavery and trafficking at mine sites and upstream of smelting can remain unidentified, especially where this is in high risk areas. This is crucial as the most severe and salient human rights and labour risks tend to occur in the trading process or at the mines, at large-scale as well as artisanal and small-scale mines ("**ASM**"), before minerals even reach the smelters.

The OECD is developing the OECD Portal for Supply Chain Risk Information to help companies understand risks in their supply chains and to prioritise those risks to enable a more efficient and effective due diligence process.

Source, OECD 2018

Reports of human rights and labour exploitation are increasingly picked up in the media. For example, in a series of reports and short films on child labour in the cobalt supply chain by news network CNN, children follow their parents into mine work. They are involved in transporting and eventually trading minerals in the local markets.[9]



TOP-DOWN MANAGEMENT SYSTEMS AND TRAINING

Some companies conduct supplier training to communicate their code of ethics policies and track attendance and seniority of participants to help analyse the impact of their training. Some companies also provide a feedback mechanism to ensure that any questions raised by participants are addressed, so that the content and delivery quality of suppliers' training continues to improve. Some initiatives also include education programmes to improve the skill set of suppliers' labour forces or healthcare services to improve the wellbeing of workers.

Where there is a clear business case for ESG integration, some companies look into comprehensive options, such as supporting a supplier to develop a human resources management systems toolkit. This is especially beneficial if local options are limited where their suppliers operate. However, there are limits to how far down the supply chain this has an impact.

AUDITS

Current methods used to increase transparency and identify and mitigate risks include audits and top-down management systems and training but gaps remain with these solutions.

Process innovation on third party audits has been limited despite significant improvements in information access and technology in recent years. Audits continue to be primarily pre-planned, driven by the reporting cycle of customers. If a supplier has multiple customers, it would need to handle multiple audits in a year.

Whilst many companies have robust monitoring and reporting procedures to ensure supplier improvements, top-down audits can have limited functions from a risk management perspective, especially when subsequent Human Rights Due Diligence (**"HRDD"**) reviews uncover violations. Corrective actions identified may not be sufficiently followed and implemented, resulting in further criticisms, including public campaigns, which tend to be high profile, exposing companies to significant reputational risks and financial consequences.

> *"There are known knowns, and there are known unknowns, but there are unknown unknowns".*
>
> Donald Rumsfeld

Companies tend to respond by sending a team of specialists for onsite inspections when labour practices and human rights violations have been uncovered. Some investors encourage companies to take a more strategic approach in assessing their supply chain risk exposure and take more proactive actions, paying particular attention to the limits of a top-down approach with little input from on-the-ground understanding of issues.

Pre-planned audits provide a snapshot of operations at a certain point in time, exposing hidden issues that are business-as-usual. A pre-determined audit procedure can also be narrow in scope, assessing only the risks that have been identified.

In addition to pre-planned audits, forensic audits can be employed when attempting to explore an alleged issue or suspected concern. These types of audits tend to be carried out without notice and use extra sources of information from parties related to the supply chain in question. For example, forensic audits may involve spending a day carrying out undercover surveillance; monitoring the activities of a production site in terms of when workers arrive and leave and which third parties come and go. It may also involve speaking with local communities such as shop owners or village leaders about their experience with the site. This information is then added to the audit findings at the actual site in question to develop a greater understanding of the actual working conditions and practices and often to ascertain if a suspicion or allegation is accurate.

Despite the limitations, a good audit is vital and can be improved in its existing format. Companies are encouraged to explore new ways to gather more and better supply chain information, including data that was not made available previously without technological developments, internet and mobile devices. There is also merit in a parallel approach which combines both orthodox auditing and new data and technology led interventions.

Technological Innovations And Supply Chain Transparency

Identifying the potential for technology to enhance supply chain transparency creates an innovative frontier and developing its full potential will create new business models. Transparency can provide confidence in legitimate operations, enabling greater access to finance, and exposing illicit practice. Visibility and knowledge of what was previously unknown can create new paradigms and news ways of thinking allowing legitimate stakeholders to demand more accountability throughout the supply chain.

Companies must seek innovative solutions when managing the increasing expectations on supply chain transparency from both customers and investors alike. International best practice would suggest that companies should consider designing a strategic system using the UNGP and the associated UNGP Reporting Framework as reference.

New technologies, including recent advances in physical goods traceability, financial technology innovations, and ground-breaking DLT, have the potential to allow for unprecedented levels of transparency in supply chains. These technology solutions can allow for more robust CoC systems with improved data collection and validation of responsible practice, improved access to liquidity for responsible actors, streamlined reporting, and improved supply chain communications. These innovations allow companies like RCS Global and Everledger to capture information from various data sets along a supply chain in a verified and auditable manner.

In addition to these new technologies leading to powerful evolution of traditional CoC systems, they can provide value through improved connectivity, efficiency improvements, and decentralised data control. For example, digitising CoC systems can help to reduce the numbers of intermediaries involved and can help reduce counterparty risk.

The real value in technology advances comes from linking those with in-depth experience in supply chain human rights monitoring to those with technical expertise in new DLT and fintech innovations to develop effective solutions. This type of collaboration could allow businesses to use data and technology to move beyond basic attempts at demonstrating compliance, towards investing in meaningful supplier partnerships focussed on mutual learning and continuous improvement.

Investors believe that downstream companies have a responsibility to ensure greater transparency in their end-to-end supply chains, and reap the most benefits when the supply chain is managed well. It is therefore important that the costs of creating a CoC is borne fairly along the supply chain, and that upstream players are not pushed to bear disproportionate costs of the system. End-user companies, as the ultimate buyers of raw materials and components, can be best positioned to ensure a sustainable supply chain. Where appropriate health and safety protection is provided, the workforce is healthier and more productive. Where remuneration is fair, and training and continuous learning is available, the workforce is stable and progressive, reducing absenteeism and improving productivity while contributing to local employment. A higher quality local workforce, in turn, strengthens the institutional monitoring framework and operational processes, which leads to more consistent and high quality products, and reduces wastes with enhanced efficiency.

In this section we consider current and potential uses of:

- DLT
- Smart contracts
- Push data

before reflecting on the remaining challenges

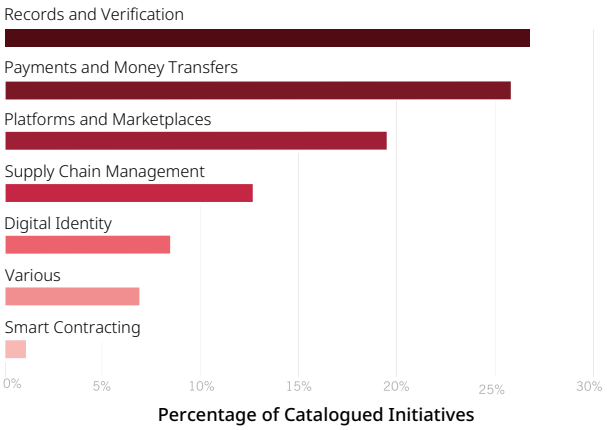
Distributed Ledger Technology or "blockchain" technology

One emerging technology that could address a number of transparency challenges is DLT or blockchain technology. The theory is that as assets move along the supply chain, the use of blockchain can allow them to be tracked permanently and record transactional data that can be used to prove provenance and material stewardship: recording key information about the source and the methods and practices employed during production, processing and transport.

Recent research has suggested that blockchain technology could be a force for good. Stanford researchers suggest that reducing risk and fraud is seen as blockchain's primary benefit (Figure 1) and the technology has significant short to medium term impact on a number of ESG issues (Figure 2).

Figure 1: Benefits of blockchain

Blockchain is most often used to facilitate payments and verify records.



Reducing risk and fraud is seen as blockchain's primary benefit.

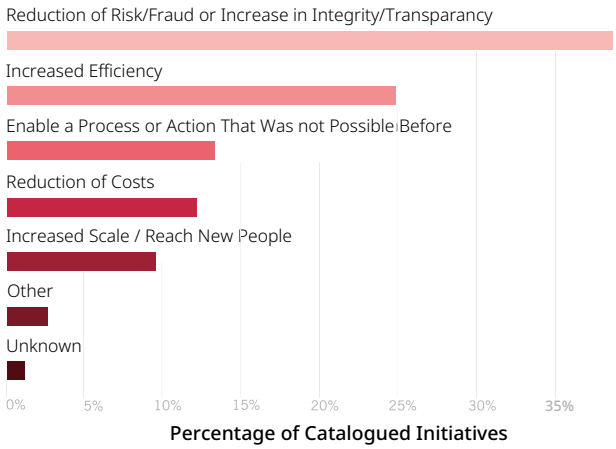
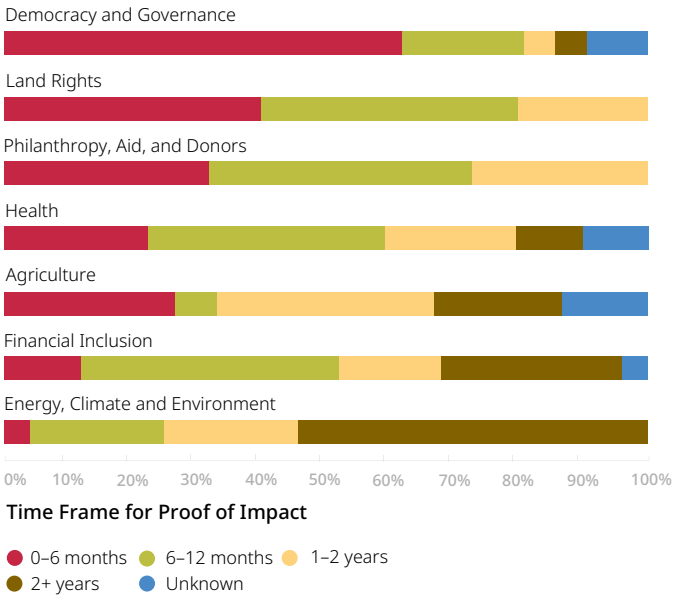
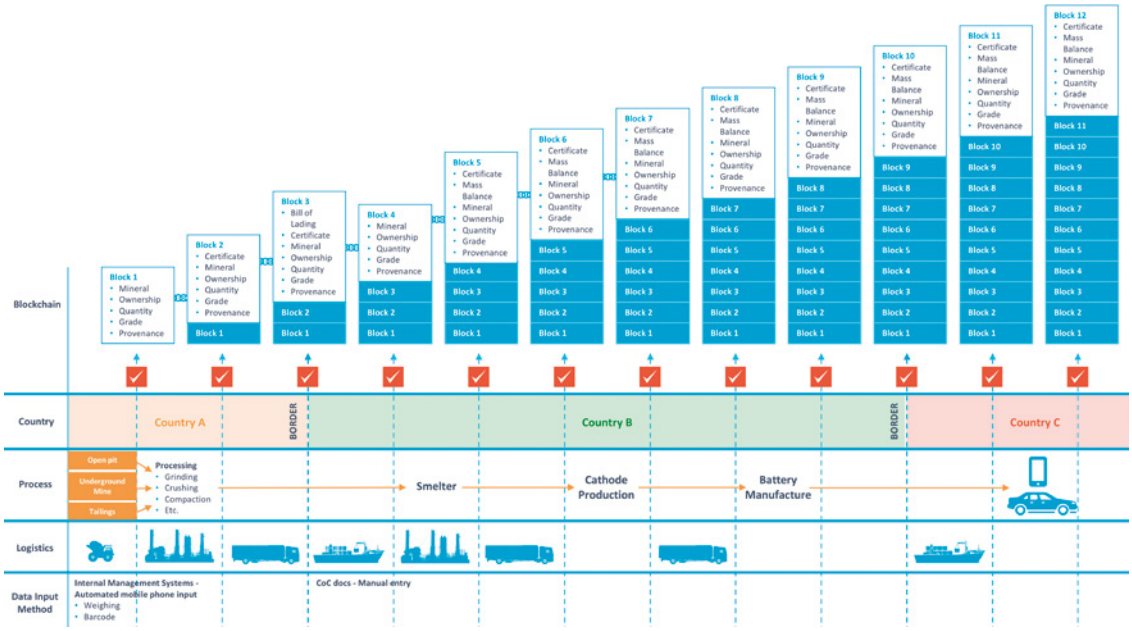


Figure 2: Timeframe and issues on ESG impact

Fifty-five percent of catalogued initiatives are estimated to have an end impact on their beneficiaries by early 2019.



Source: Galen et al (2018) blockchain for social impact.[10]



Source: RCS Global, 2017

Features of blockchain

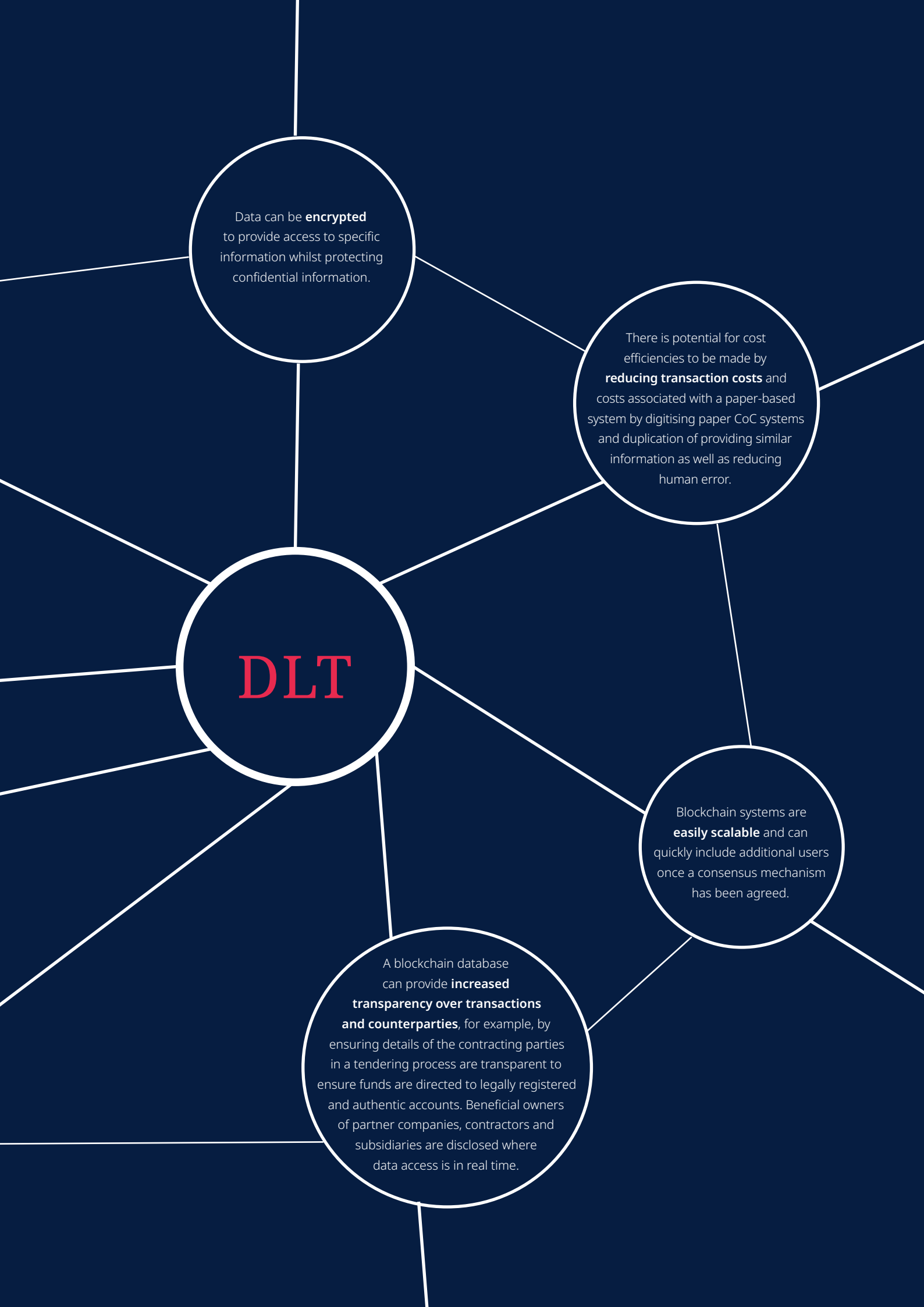
A key feature of a blockchain system is that it can create a database and interact with other technologies to plug gaps in data collection and enhance audits and investigations. Blockchain can be used as part of a system that also interacts with other technology innovations to include data collected using smart devices and the Internet of Things (**"IoT"**), for example, smart-phone apps and drone surveillance cameras. Smart contracts can also be used to process counterparty transactions automatically without human interference when pre-determined conditions are met, reducing the risk of counterfeits.

Provides a **digital database** that can be used to record supply chain transactions and data relating to provenance and material stewardship creating a visible and auditable trail that includes, for example, meta data points, high resolution photography and other unique data creating an ecosystem of trust and consensus amongst stakeholders throughout the supply chain.

The blockchain is **"immutable"** because every block is time-stamped and validated based on previous blocks. This makes past information very difficult to alter and makes transactions traceable and resistant to tampering since past data can only be altered if all participants in the chain are in agreement.

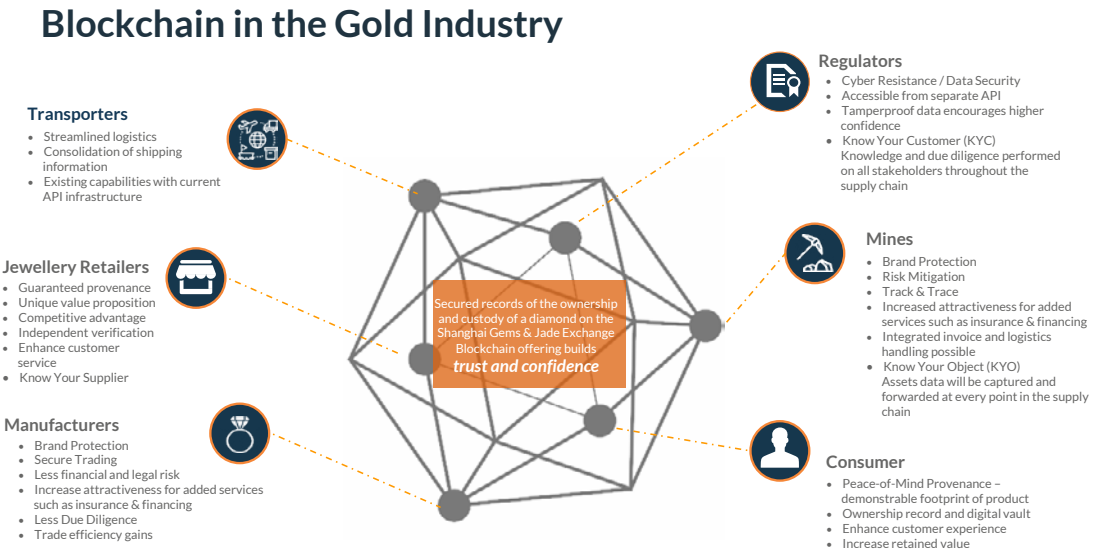
Because blockchain is based on a **consensus mechanism**, participants in the blockchain will need to agree on what standards are relevant, the type of information and risk data that is required and how compliance will be measured and monitored. This has the potential to reduce challenges, inefficiencies and costs associated with multiple and non-standardised requests for information and diverging standards and approaches to compliance. It also has the potential to enhance the utility of trade associations' standards and frameworks.

Data can be made accessible to relevant third parties like investors and is **accessible in real time**. Where data access is not in real time, appropriate procedures and key check points could still be put in place to provide a blockchain-lite approach, reflecting the most updated records given connectivity constraints.


Data can be **encrypted** to provide access to specific information whilst protecting confidential information.
There is potential for cost efficiencies to be made by **reducing transaction costs** and costs associated with a paper-based system by digitising paper CoC systems and duplication of providing similar information as well as reducing human error.
DLT
Blockchain systems are **easily scalable** and can quickly include additional users once a consensus mechanism has been agreed.
A blockchain database can provide **increased transparency over transactions and counterparties**, for example, by ensuring details of the contracting parties in a tendering process are transparent to ensure funds are directed to legally registered and authentic accounts. Beneficial owners of partner companies, contractors and subsidiaries are disclosed where data access is in real time.

Working with the gold supply chain as an example, Everledger's platform can collect and assess mining practices including assessing worker details and obtaining data on production and processing capacity creating transparency for downstream provenance. Additionally, through automation and data sharing, the cost of compliance and risk can be reduced. Decentralization guarantees complete transparency, meaning anyone along the supply chain can see how, when and where the commodity was produced and who was involved every step of the way.

News is filtering through about blockchain initiatives covering a number of minerals supply chains, from gold to cobalt.[11] For example, Everledger helps identify gold-supplying counterparties verify their identity using reliable, independent source documents, data and information. Each transaction is matched to the data of the asset involved in the transaction. Each of the counterparties are subsequently monitored against OECD Due Diligence Guidance for Responsible Supply Chains of Minerals (by leveraging an in-built compliance module). Working with refiners' existing supply chain traceability systems Everledger's platform can integrate with different parties' enterprise resource planning or inventory management systems to share information about the gold they are transacting. Placing this structured data on the blockchain, stakeholders can share and receive information in a de-facto standard resulting in the proof of provenance for the downstream. This can help build the foundations for new gold products such as "*mercury free gold*" to help combat the risks in the gold supply chain.



Smart Contracts

Smart contracts embedded on the blockchain can be used to trigger "*If this, then that*" protocols allowing companies and consumers alike to have confidence in the security of the supply chain and eliminate the need for intermediary parties to confirm the transaction.

They have particular potential for application in the traded commodities market, where warranties and indemnities could be incorporated to guarantee or "*certify*" provenance. There is potential for this to enable producers who can demonstrate that they are complying with recognized or agreed standards to charge a premium for their products.

Steps throughout a supply chain can be governed by business logic ensuring verification, reliability and compliance in real-time. Should things go wrong it is possible to figure out what went wrong and who should be held accountable. Through a sustainable network the chain of accountability can be provided to all participants.

Since smart contracts are pre-written computer codes, their use may present enforceability questions if attempting to analyse them within the traditional "*contract*" definition. This is particularly true where smart contracts are built on permissionless blockchains, which do not allow for a central controlling authority. Since the point of such blockchains is to decentralize authority, there might not be provision for an arbitrator to resolve any disputes that arise over a contract that is executed automatically.

It remains unclear whether the elements of capacity, including the ability to rely on apparent or ostensible authority would apply and the questions of offer and acceptance, certainty and consideration would also need to be considered. However, there have been advances in many countries regarding the level of acceptability of electronic contracts so it is realistic to hope this is carried over to smart contracts.

The use of smart contracts will need to be paired with trusted certification regimes to allow buyers to be confident about what they are paying (extra) for.

Although this pushes responsibility down to producers and processors (each of these may, for example, add their own "*guarantees*" into a smart contract as the commodities pass through their hands, adding value and transparency throughout the chain) the growth in consumer demand for "*ethical*" or "*responsible*" products, which has characterised the last decade, suggests that this investment may be recoverable from brands willing to pay a premium for products produced in this way.

Push data and data analytics

Another way of improving transparency gaps may be through the use of "*bottom-up*" push data and technology in combination with analytics tools, to:

(a) verify audit data throughout the year, rather than on a single "*snap shot*" basis;

(b) create an early warning/ red flag system enabling companies to understand where it might be necessary to focus efforts where resources are limited; and

(c) measure the effectiveness of existing programmes to monitor, address and remedy any issues identified.

Push data includes data collected locally through smart devices and the IoT, including but not limited to drone surveillance cameras and videos, where local laws and regulations allow and smart meters for measuring emissions, waste and water usage. Technology that is global positioning system ("GPS") enabled tracks raw material transformation, based on processing operations and workflows.

Push data can also include human generated data such as worker feedback; worker self-verification that their labour rights are respected at applicable stages of the production process; labour union activities; objectives and progress; anonymised health and safety data that highlights at risk workers; and any remedial actions.

An audit of existing data sources may also show that data is already available which can be used as a starting point, with further data sources being added over time to gradually build up a more sophisticated picture. For example, many mining companies will already be required to report on amounts of raw and processed materials in accordance with their licence/ royalty requirements.

The Better Sourcing Programme ("BSP") by RCS Global, uses mobile-backed technology to provide real time on-site risk and incident monitoring as well as traceability from mine to export, with a specific focus on ASM. Through its monitoring system BSP also pulls in and monitors multiple human development indicators allowing the impact of development interventions to be continually measured.

All materials entering a BSP monitored supply chain are checked against 16 core criteria aligned to OECD best practice to ensure they meet the ethical standards, key global regulators and the market overall. Through a smart-phone based application, trained BSP field-agents then monitor mine sites and trading chains and collect and transmit data on risks and incidents through a central base to supply chain participants.

The electronic traceability system complements this online data flow to track physical material from mine site to export. Data is captured in a dynamic dashboard offering supply chain participants a real time view of traceability and due diligence data.

The system is the critical bridge to the "*final mile*" in many complex ASM mineral supply chains where ethical sourcing risks are often present. The approach is already operational across 3TG minerals and is also being piloted in the Democratic Republic of the Congo cobalt sector. The Better Sourcing approach and the data it provides is also blockchain-ready and is seen as part of the solution to the "*garbage in, garbage out*" challenge faced by blockchain providers entering the ASM sector.

Delivering the data: The steps involved in the Better Sourcing Model

Supply chain evaluation

1. Conducted ahead of project and then updated with every shipment as required

Smart monitoring by field agents

1. Use of smart-phone based mobile application to collect data
2. Trained BSP agents on site to collect, verify, and upload data
3. Agents also assess sites for risks, incidents and impacts Collect socio-economic data

Electronic Traceability System (where needed)

1. Reconciles information on volumes, dates, export route, identification of stakeholders before export
2. Tamper-proof tags which can only be scanned at pre-identified chain of custody checkpoints
3. Linked to Incident data: issues such as smuggling or untraced minerals raise an alert/incident

Information collected in a single secure database

1. Risks, incidents and impacts directly relevant to the supply chain Grievances
2. Contextual socio-economic data collection
3. Mitigation plans and their status (ongoing, closed, reported)

Reporting

1. Real-time dashboard based information
2. Improved due diligence
3. Transparent information for stakeholders

Compilation and analysis

1. Better understanding for supply chain participants

The data itself:

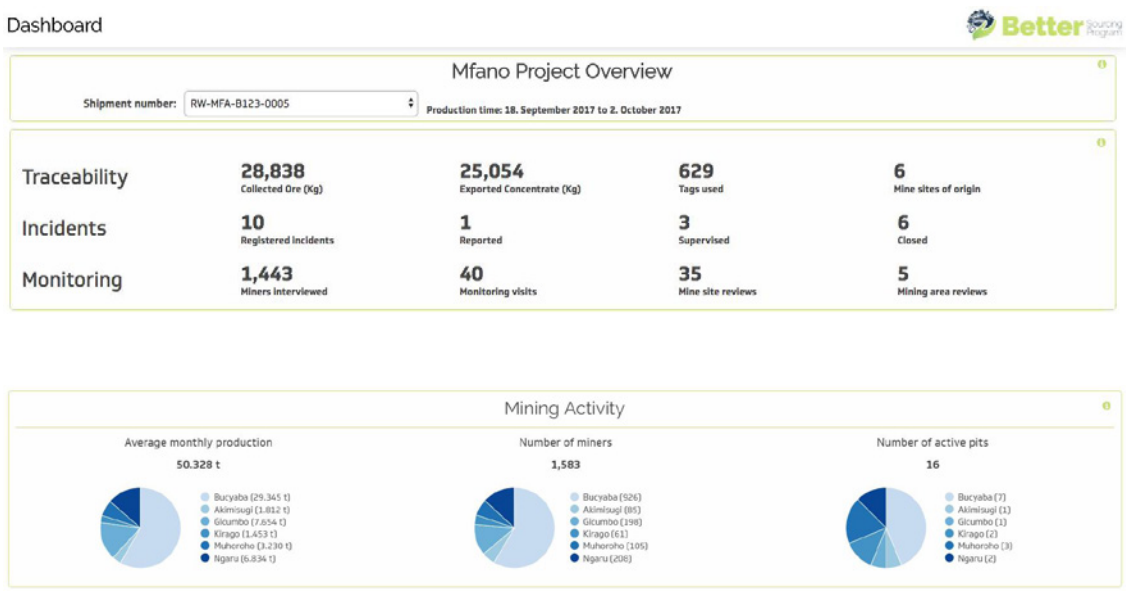
The result of the Better Sourcing Approach is constant, consistent and structured data telling the story of a respective ASM mine site.

Data is split in to two key segments:

1. Risk and incident monitoring and traceability
2. Social context / Human development impact assessment

The visual below outlines how the data is structured and visualized through the current Better Sourcing Dashboard.

A snapshot of a Better Sourcing Data Dashboard



Technological Innovations: Challenges Remain

The end goal in increasing transparency is to minimise uncertainty for all those involved in global supply chains. However, with increasing knowledge and transparency of supply chain potentially comes increasing tension between (on the one hand) a business's commitments to domestic laws and international standards and (on the other hand) the practical challenges of (a) understanding the detail of local practices within a potentially long and convoluted supply chain made up of multiple players; and (b) using leverage to address these where appropriate.

These challenges mainly fall to those downstream, where pressure is most evident from investors, customers, and NGOs and others looking to highlight issues through brand and reputational pressure.

Many investors have supported businesses to develop and improve more traditional, top down compliance. As set out above, new technology may now provide an opportunity to allow more bespoke, bottom up approaches, where market conditions and legal frameworks and risk factors support that approach.

The best way to address these challenges will not be homogenous across the sector (and certainly not across other sectors) and needs to take into account:

(a) how to connect technology to physical commodities;

(b) data issues;

(c) the availability and strength of trade bodies; and

(d) the need to respect local stakeholder needs and wishes.

Uniqueness and tradeability

The ability of stakeholders to leverage the use of DLT to input or record data and verify its integrity will depend on the commodity itself. To be saleable, commodities need to be transformed into a useable form and moved to where they can be used according to when they are needed. The use of DLT will also be affected by how commodities are traded – spot market, long term supply or exchanges. This can create challenges in linking the digital and physical in a parallel process and ensuring the consignment is fully audited throughout the chain.

When working with bulk commodities, the challenge is emphasised as the commodity will physically morph into something quite different. The ability to track the commodity at the point of change then after the transformation becomes apparent. The commodity sector traditionally accounts for this through processes like mass balancing, which use scientific methodology and analysis to account for any physical change. However, differences may occur in the output which may lead to higher costs. DLT may not directly solve issues with output but it may be used for stakeholders to commonly agree any inputs against outputs ensuring a greater deal of trust amongst all parties involved in the process.

Data issues

Whilst decentralised and shared data encourages more transparency, commercial and legal sensitivities can mean that stakeholders are reluctant to share their data, becoming a barrier to take-up. Ensuring data security and privacy, particularly in light of the introduction of the European Union's General Data Protection Regulation ("GDPR"), which means organisations are now subject to greater scrutiny around third party access to data and data storage solutions, will need to be the priority of any DLT platform provider. This might be done, for example, by limiting membership of the blockchain to "*trusted*" nodes and encrypting the data. Successfully balancing privacy requirements and transparency benefits should provide stakeholders with the confidence they need to partner with a DLA Piper provider.

DLT and Artificial intelligence (**"AI"**) can work together to provide a scalable solution with huge data analytics capability. Data protection will again be a key consideration when a third party AI tool will be processing any personal data on the provider's behalf. Cyber security of businesses must be strengthened as IoT provides opportunities for advanced hacking activities. With any supply chain intensive business there are huge data sets being created and by modelling those datasets it is possible to channel the information to help customers understand exactly the information they need from the supply chain; what, why, where, when and who in relation to the provenance of the item.

However acquiring large volume data sets, standardising and training machines is a large undertaking and to achieve required results above 90% accuracy is very time consuming. As any DLT database will grow rapidly in size as new transactions are written, there is a risk that the size of the database required and the consequent speed of access may make it unsuitable for transactions where speed is of the essence and could involve significant run costs, in particular energy.

Availability and strength of trade bodies

Where the ability to track and trace particular commodities is limited, trade bodies who have significant market coverage and leverage with powerful market players, can take concerted efforts at an industry level to undertake activities at different stages of the supply chain in accordance with agreed standards, audited and assured to an objective standard. This approach has been used, for example, with fair trade produce, to confirm that a certain percentage of raw materials come from certified suppliers.

However, businesses purchasing certified materials will need to consider carefully how this fits with their domestic law requirements and statements regarding compliance with international standards throughout their supply chain. The use of a percentage certification schemes may, however, be the only practical means of certification in the short term until such time as the industry as a whole might decide that it wishes to start working to a fully traceable system.

In contrast to the situation with more easily traceable commodities such as diamonds, certification that all raw materials are sourced from audited/certified suppliers is unlikely to become a reality until all suppliers of a certain raw material sign up to a full track and trace scheme. In the current state of the market, that is a significant challenge that needs to be overcome.

As a global issue, this will also need consideration of the different competition law systems which may apply. In broad terms, and assuming that the core principles of assuring that certification and transparency regimes are beneficial to the consumer (by allowing the consumer to have confidence in the product they are buying), these regulatory considerations should not be a bar to companies wishing to work with competitors through trade bodies to establish industry norms for certification and transparency regimes. EU and US case law suggests that using the "*rule of reason*" approach, the benefits of establishing such industry minimum standards are likely to override any potentially negative effects on competition between businesses. This does need to be backed up by evidence that the standards have been subject to proper consultation. A potential way of showing this could be to evidence that they are based on a previously consulted standard, such as the UNGP.

Respecting local stakeholders

The use of DLT seems to work best within a corporate group, or amongst a set group of business partners, where extensive auditing and governance systems are likely already in place and can be built upon.

One risk that needs to be addressed is that a system which provides the highest level of transparency could push smaller players out of the markets, and could large businesses to incorporate the full supply chain into their own group, ultimately reducing competition. This is particularly the case for blended commodities/ commodities traded through network supply systems where there is little price incentive for smaller suppliers to adopt expensive certification regimes.

From a competition law perspective, there must be a balance between ensuring that small and medium sized enterprises not excluded from the market by the potentially high financial and time costs of complying with emerging industry minimum standards and enabling consumers to be confident in the products that they are buying. This will be judged by the standards of "*fair competition*" meaning that companies which are incurring higher costs in implementing minimum and/or best practice standards should be able to benefit from demonstrating that they have done so, even if this might have a detrimental effect on competitors who have chosen not to, or cannot afford to do so. This is because the aim of competition law is not to protect competition between businesses per se, but to enable the consumer to make fair and informed choices.

Commercial Issues and Risk Appetite

Addressing these challenges and improving supply chain human rights risk management and transparency might be addressed by using a range of technology solutions where some will work better in different parts of the market depending on practical and commercial issues and risk appetite.

As many DLT solutions are currently in development or pilot phase, the technology and policies offered are relatively nascent. Many stakeholders will be uncertain of using services in relation to business critical activities without a high degree of confidence in the quality and stability of the blockchain.

Technology-based solutions will necessarily have to design data-protecting DLT platforms. This might include limiting who can join the network to "*trusted*" nodes and encrypting the data on the platform. Although it remains to be seen how DLT providers will approach the balance of privacy versus transparency. Whatever solution is adopted, it will need to be designed and structured so as to ensure cyber risk and data breaches are minimised.

Ultimately, many businesses will be driven to adopt technological systems to complement existing systems designed to minimise legal and reputational risks of operating in this complex market, meet investor expectations with respect to ESG compliance and ensure that they are able to stand behind public statements and demonstrate real world compliance when called to do so. But no system is infallible, and the reliability of data in the blockchain depends on verified data being inputed to start with, so who can, should or must take responsibility for the data accuracy and reliability at the different stages of the chain and how might this affect the market if use of these technologies becomes widespread.

From an intellectual property perspective, there is inevitably value in a DLT platform and ownership of such intellectual property will form an important consideration of the stakeholders at the outset, including commercialisation of the underlying data set and the output of the data analysis and AI learnings of any AI component. A choice will need to be made as to how open or closed the network is: ultimately, we presume a permissionless network from which lessons can be learned from the Open Source community will be required to ensure the widespread adoption needed in order to realise the benefits.

In summary, the allocation and attribution of risk and liability in relation to a malfunctioning DLT service must be thought through carefully, at the outset as between all relevant participants in the chain.

Questions For Further Discussion

Do businesses see a need for a bottom up approach to complement current top-down approaches to supply chain risk management?

Is this another squeeze on small and medium sized enterprises?

Is it realistic to expect whole market engagement/ change and how long might that take?

Can the downstream be incentivised/pressured in to sharing the cost-burden of driving data-led improvements in responsible sourcing? At present the cost burden remains with the upstream.

Could we see the opportunity for the emergence of a premium ethically sourced minerals market backed by DLT? Would the market pay an ethical premium on purchases?

What is the role of investigations in identifying risks and how can this technology support more forensic investigations at key choke points/risk areas in a supply chain?

What is the role of trade associations and industry groups in operational level data collection and verification?

How does this fit into the UNGP framework of human rights due diligence?

How can this enhance operational level grievance mechanisms in due diligence processes and in providing for remediation?

How can we exert more control through a supply chain whilst also minimising legal risks associated with increased control? Or does this remove the impetus to ensure comprehensive systems are developed?

As more investors seek positive impact of their investments and links between business activities and sustainable development goals (SDGs), how can improved community impact be better linked to business outcomes?

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