

Shaping the Future of Advanced
Manufacturing and Production

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An Open Platform for Traceability: Accelerating Transparency and Sustainability across Manufacturing Ecosystems

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Executive summary

While the manufacturing and production sectors comprise 16% of global GDP and are key drivers for economies around the world,¹ the complex network of supply chains on which these sectors rely presents enormous economic, social and environmental risks that must be collaboratively addressed. Blockchain technologies have the potential to mitigate these risks by enhancing transparency and traceability that can be leveraged to create more efficient and sustainable supply chains. Capitalizing on this potential requires accelerated adoption of blockchain – and blockchain-enabling – technologies, but also new collaborative and neutral platforms to visualize and share traceability data to enable a culture of transparency and mutual accountability across these global networks, while providing consumers with the information they demand.

To address these challenges and opportunities, Everledger, the International Trade Centre (ITC) and Lenzing Group, in collaboration with the World Economic Forum's Platform for Shaping the Future of Advanced Manufacturing and Production, created a pilot platform – hosted on the ITC's neutral site – capable of visualizing blockchain-based supply chain data from multiple companies and sources. These champions, and their first-of-its-kind platform, now seek to include more companies on the platform, while answering the remaining questions about which data to visualize and how to address privacy concerns, as well as key technical questions that will be critical to the future of digital traceability. The Fourth Industrial Revolution is reshaping the world and it is imperative that these new innovations are used to help balance economic growth with a more inclusive and sustainable future for all.

Context

At the heart of the global manufacturing and production economy is a complex supply chain network designed to create the highest-quality products for the lowest price. While these globe-spanning networks are instrumental to the business models of every sector, the evolution of these supply chains, as well as the current – and shifting – global context in which they operate, is creating new challenges that must

be addressed rapidly if the world is to maximize its inclusive growth potential in the coming years. The world is now at a critical juncture where businesses must act to respond to four main trends affecting the future of supply chains: 1) the increasing complexity of supply chains; 2) growing consumer demand for transparency; 3) criticality of enhancing sustainability; 4) increasingly dynamic/shifting supply chains.

Nearly two centuries ago, economists such as James Mill and David Ricardo contributed to the defining economic theory of comparative advantage, and it is possible to argue that today's global supply network is a resounding endorsement of at least parts of that theory. For most products and sectors, a final product's value-added components span the globe – with each player involved focusing on their own niche area of expertise. Yet this inherent complexity also represents an enormous risk to the companies that benefit from the savings generated by this system. In fact, nearly one-third of global chief executive officers identify supply chain complexity as one of their top business risks.² As the complexity grows, visibility and monitoring become even more difficult for the brands selling the end product – a risk directly linked to the second trend of increasing consumer expectations for transparency.

Today, consumers are more aware than ever, and more concerned than ever, about the social and environmental impacts of the products they purchase. Correspondingly, consumers have become more reactive – and appropriately so – to accidents, transgressions and worker exploitation in brands' supply chains. The opacity of supply chains significantly increases the risk for companies as they are held accountable by consumers regardless of whether they were aware of issues or not – and consumer expectations and brand accountability are only continuing to expand in scope. Consumers are no longer satisfied knowing solely *what* is in the products they purchase, they also demand to know *from where* those inputs came.

As the demand for transparency grows, and the complexity of our global supply chains comes increasingly into the light, manufacturers and consumers alike have seen the impact

that supply chains have on the broader global sustainability agenda. Whereas supply chain sustainability conversations began on subjects of worker welfare, safety and sustainability measures at specific manufacturing sites, they have since expanded to include the tremendous impact these complex supply networks have on climate change. In 2015, the International Transport Forum estimated that more than 7% of global CO₂ emissions resulted from international trade-related freight transport alone.³ While complex and globe-spanning supply chains have contributed to reducing the direct costs of many products, the indirect costs – particularly the environmental ones – are becoming more evident. Again, they present an enormous risk to companies operating in a setting in which consumers are increasingly concerned by the impact of economic activities on the environment.

The risks to companies are further compounded by the fact that locations of value creation in supply chains are beginning to shift. Three mega-trends in particular – trade tensions, climate change and emerging technologies – are disrupting these networks and establishing a new distribution of global value.⁴ While some regions and countries may have dominated the inputs of certain product lines for decades, global mega-trends may make those regions obsolete or uncompetitive in the near future. As these shifts occur, it will become increasingly difficult for companies to monitor and track changes in their supply chains under current operating conditions.

The tool

While the above context is something that has been unfolding for decades, until recently society has lacked a tool to comprehensively address these challenges.

Enter the distributed ledger, aka blockchain.

Originally brought to market as the underlying technological architecture for the cryptocurrency bitcoin, blockchain enables the creation of a distributed and immutable ledger that is now finding uses in sectors as diverse as diamond traceability and verification, health data management, the traceability of apparel and other textile products, property management and brand protection. It is also proving instrumental in the effort to enhance traceability across supply chains.

By creating unique identifiers and applying dynamic cryptographic solutions, companies are beginning to be able to apply blockchain solutions that track product inputs from raw materials all the way through to the final products that reach their retail locations and end users; enabling, in some cases, reclamation, recycling and remanufacturing.

Applying the tool: the opportunity and challenge

While many companies are already deploying blockchain solutions to facilitate this level of traceability throughout their supply chains, the technology has yet to realize its full potential to address all of the challenges and risks outlined above. The private blockchain networks being deployed by companies will certainly help increase visibility of the complex nature of their supply chains as well as identify if and when shifts in value happen, but in and of themselves, these blockchain applications do not address the challenges of customer transparency demands and increased sustainability.

Additionally, while some companies have begun to make parts of their blockchain-based supply chain data

public through their own sites or the applications of their blockchain solution-providers, this creates new challenges for consumers in terms of ease of access to the data of a growing number of companies, each of which displays its data on different platforms, the ability to trust the data source itself (e.g. is it really blockchain-based data?) and the ability to understand positive and negative changes in these supply chains over time.

Addressing these new challenges requires companies to rethink how they use and share their blockchain supply chain data. To maximize the potential of this technology to improve transparency and sustainability, the world needs a new single-source platform where consumers can access traceability data across multiple sectors and brands. For this to work, however, such a platform would need to be independent and neutral and capable of overcoming the technical challenge of presenting data from multiple sources that apply differing blockchain protocols.

The first step

In January 2019, seeing these challenges, the untapped potential of blockchain and the need for a new globally trusted solution, a core group of champions consisting of Everledger, the International Trade Centre (ITC) and Lenzing Group and its blockchain solution-provider TextileGenesis™, supported by the World Economic Forum, launched a pilot effort to begin to capture some of this potential. Before trying to convene a massive coalition of partners agreeing to share data, however, this effort elected to first provide, in 2019, a proof-of-concept that a trusted home for such a platform could be found and that the technical challenges associated with visualizing data from different blockchain solution providers could be overcome.

The International Trade Centre, an international organization based on universal membership and neutrality,⁵ provided the perfect home for this pilot platform. As host of the traceability platform – via its Sustainability Map (<https://sustainabilitymap.org>) – the ITC can assure all parties that their data will not be shared externally and that sensitive data can be hosted at UN data centres to benefit from UN neutrality, immunities and privileges.

Also as part of this effort, Everledger, an independent technology firm and global leader in blockchain-based traceability services, and Lenzing Group, a world-market leader in the production of renewable wood-based fibres (mainly used in textiles), agreed to share their blockchain data – generated by different companies using their own proprietary protocols – with the ITC in a pioneering effort to fulfil the transparency and sustainability potential of blockchain for supply chains. As part of this process and learning journey, this core group of champions overcame critical and often unforeseen challenges ranging from privacy concerns of supply chain partners to technical questions about how data is shared, presented and accessed on the new platform.

This first-phase result, to be highlighted during the World Economic Forum's 2020 Annual Meeting in Davos, demonstrates that transaction data from two separate blockchain-based systems can be ingested, aggregated and visualized by an independent and neutral third-party platform. While this is an enormous step towards addressing the main challenges facing today's global supply chains, many questions remain to be answered and addressed.

Phase 2 challenges

Which data is visualized?

A vital part of the value proposition for any company to use a blockchain solution for traceability throughout its supply chain is to reduce the opacity and increase its ability to respond if something goes wrong. However, in today's 24-hour news cycle, live and transparent supply chain data may also be a tool that could be used to attack or harm a company's reputation. If all such data is pushed to an open platform and something goes wrong in the supply chain, companies are likely to suffer significant negative consequences, even if they had taken every step possible to act responsibly and respond quickly. Phase 2 of this effort will seek to identify how such concerns might be mitigated without sacrificing the integrity and transparency of the platform.

How to manage privacy?

Central to the discussions about supply chain transparency, and visualizing data on an open platform, is getting buy-in from suppliers to be included in the data that is shown on the ITC platform. Many companies, however, do not want their competition to know who their suppliers and customers are. The pilot phase relied on extensive conversations with players in the supply chain, who finally agreed to be part of the data visualization; however, this creates a challenge if the goal is full transparency at scale.

Greater pressure from brands across their supply chain could force companies to accept this level of transparency. Alternatively, companies that do not immediately agree to releasing their data for visualization could be de-identified on the ITC platform, but this again raises important questions about maintaining the integrity and overall purpose of the platform.

How will the data integration be executed?

Perhaps the greatest technical concern is how the blockchain data is to be sent to, integrated with and authenticated by the ITC platform. The primary discussion during the pilot phase of this effort centred on exposing an application programming interface (API) from the blockchain system so that the data can be fed to the ITC platform. This again touches on the previous challenges (e.g. Which data is shared? Which data must be de-identified? etc.), but it also raises additional concerns.

One such concern relates to the authentication of the data. Future iterations of the ITC platform should be able to authenticate that the data is indeed blockchain-based, and not simply unconfirmable data manufactured by a company. While this will not affect the user interface for a consumer accessing the ITC platform for information, it is instrumental to ensuring future trust in the platform to share accurate data.

An additional question in this space revolves around whether data should be presented live. This again goes back to the potential reputational risk of full transparency, but it also relates to new concerns about the safety of goods across the supply chain. For example, if the diamond industry were to integrate with an open and live traceability platform, there is the possibility of significant increased risk that someone might attempt to intercept and steal a

diamond shipment. Live data might be critical to some sectors, while creating unnecessary risk for others. Producing a framework to address these discrepancies will be critical to the future success of digital traceability platforms.

What additional functionalities are necessary for the platform?

Important questions remain about additional validations that the platform may eventually be expected to perform, such as factories claiming to have certain certifications (e.g. Leadership in Energy and Environmental Design [LEED]-certified buildings). Future iterations of a platform should be able to confirm if the certifications listed by suppliers are verified. This may be a manual or automated process and will likely be instrumental to the value proposition of any platform aiming to be the open platform of choice.

Finally, the extent to which supplementary contextual data should be integrated into the system remains to be answered. The ITC has tremendous amounts of sustainability-related data covering regions around the world. It may be possible to overlay such data with this traceability platform to provide a more comprehensive overview of not only the specific suppliers in a supply chain, but also the broader social and environmental regional climates in which they exist.

Call to action

While certainly not a panacea to the challenges facing today's global supply chains, this effort aims to accelerate and amplify the potential impact of blockchain to improve the transparency and sustainability of these networks.

Critical to Phase 2 of this effort will be incorporating more data sources and more perspectives to help address the challenges outlined above. To this end, this paper represents an open call to brands and suppliers currently using blockchain for traceability to join this effort and help shape the future of digital traceability to enhance the transparency and sustainability of the global manufacturing and production ecosystem.

Endnotes

- 1 "World Development Indicators: Structure of output", The World Bank, <http://wdi.worldbank.org/table/4.2#> (link as of 11/12/19).
- 2 "Trust, Transparency and Traceability", Accenture, https://www.accenture.com/t20160729t074954_w_/cr-en/acnmedia/pdf-27/accenture-trust_transparency_infographic.pdf (link as of 11/12/19).
- 3 "The Carbon Footprint of Global Trade", International Transport Forum, <https://www.itf-oecd.org/sites/default/files/docs/cop-pdf-06.pdf> (link as of 11/12/19).
- 4 "Reshaping Global Value Technology, Climate, Trade – Global Value Chains under Pressure", World Economic Forum, http://www3.weforum.org/docs/WEF_Reshaping_Global_Value_Report.pdf (link as of 11/12/19).
- 5 "How ITC Works", International Trade Centre, <http://www.intracen.org/itc/about/how-itc-works/> (link as of 11/12/19).