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Transparency and Traceability: Digitizing Global Supply Chains to Unlock the Circular Advantage

Learnings from Investing in Supply Chain Transparency by Closed Loop Partners' Ventures Group

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Closed Loop Partners

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About Closed Loop Partners

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Closed Loop Partners is an investment firm and innovation center building a circular economy, a new economic model focused on a profitable and sustainable future. The firm is comprised of venture capital, growth equity, private equity, project-based finance and an innovation center. Our ecosystem connects entrepreneurs, industry experts, global consumer goods and technology companies, retailers, financial institutions and municipalities.

About Closed Loop Ventures Group
Closed Loop Partners' Ventures Group invests in early-stage companies developing breakthrough solutions for the circular economy, exploring leading innovations in material science, robotics, agritech, sustainable consumer products and advanced technologies that further the circular economy. The group was founded in 2017 and has made investments across four sectors: plastics and packaging, food and agriculture, fashion and beauty and supply chain logistics and technology.

About this Landscape
Closed Loop Ventures Group believes supply chain transparency and product traceability will be a critical enabling technology for the circular economy and an immediate response to the COVID crisis. Tracing supply chains can optimize the flow of materials, better manage inventories, and enable stakeholders to more quickly identify and react to increasing physical supply chain risk. These trends of transparency and traceability are flowing today through the food, consumer products and apparel supply chains, and these trends will increasingly affect every material and commodity.

Business-as-Usual Is Broken

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It has become exceedingly normal to see products from halfway around the world show up right outside our doors—sometimes, within just one or two days of ordering. Our global supply chains connect the material source, the means of manufacturing and the consumption of products over great distances and disparate geographies. These are massively complex and interconnected systems, yet neither brands nor consumers typically know what happens during a product's journey, and value is often lost, stolen or otherwise diminished along the way.

Supply chains today are shockingly analog. The lack of digitization results in blind spots and, in turn, the opacity can create inefficiency and hurt the bottom line of stakeholders. COVID-19 further exposed the vulnerabilities of our current system. Perhaps most noticeably in shortages of products like food and toilet paper and food wasted in the field when supply and demand did not match. Supply shortages, factory shutdowns and subsequent delays in delivery plagued the globe, resulting in significant waste and commercial losses.

New norms required producers to quickly adjust their sales channels and product formats, for example, shifting from supplying restaurants and offices in bulk to supplying grocery stores and direct-to-consumer e-commerce channels in smaller formats. Without the digital tools that can enable greater agility of identifying new sales channels and accessing new packaging materials, changing the status quo as drastically as the pandemic required entailed unnecessary costs and waste for businesses.

With more frequent and severe climate-related disasters that increasingly expose supply chains to physical risk, shocks to the system—like the COVID-19 pandemic—will continue. As the world rebuilds the new status quo, there is an urgent need for more resilient and circular supply chains. Global supply chains are long overdue for a digital transformation, requiring transparency and traceability to optimize how products travel from production source to end-of-life—and back again.

Digital Drivers Enable Efficiencies

FORTIFYING SUPPLY CHAINS THROUGH TRANSPARENCY AND TRACEABILITY

The pandemic laid bare the commercial need for supply chain transparency. Businesses are and will continue to be exposed to loss and inefficiency without digital visibility and agile operations that link producers to manufacturers to end consumers.

However, consumers were already demanding transparency and traceability in a pre-pandemic world. Increasingly, consumers want to know who made their products and where. As news headlines bear stories of wildfires disrupting transport, of metals extracted from conflict-ridden regions, and of counterfeit, fraudulent products uncovered within the system, transparency and traceability are of mounting importance for consumers and C-suites alike.

Businesses and consumers are not the only stakeholder taking note of this space. Regulators like the US Food and Drug Administration (FDA) proposed mandated traceability for critical food supply chains to ensure consumer safety. The FDA is joined by the USDA, who is participating in the Biden Administration's Build Back Better Initiative to invest in making food supply chains stronger and more resilient. These transformative changes will have business implications on the bottom line and will require a digital shift to full transparency and complete traceability.

Historically, the ability to aggregate data, to process multiple transactions simultaneously and to visualize risk was not feasible at a viable price point across global supply chains. However, improvements in processing capacity, tagging technologies, and validation technologies are enabling a new market around transparency and traceability. The combination of these technologies has created an inflection point set to establish a new revolution in production and distribution efficiency.

The time for change is now, as market forces, demand drivers and technological capabilities are all aligned, driving tailwinds behind transparency and traceability as key enablers of circular and resilient supply chains.

The following landscape draws on Closed Loop Ventures Group's experience diligencing technology providers and conducting expert interviews with supply chain managers across industries.

This landscape answers the following questions:

Why are brands and corporations adopting supply chain transparency and product traceability?

Where do transparency and traceability solutions integrate in the supply chain?

How do transparency and traceability solutions actually track and trace products?

What needs to be true for transparency and traceability solutions to be successful?

Why are brands and corporations adopting supply chain transparency and product traceability?

Why are brands and corporations adopting supply chain transparency and product traceability?

You can't manage what you can't measure.

Transparency and traceability help companies achieve a combination of the following:

Value Creation

Transparency and traceability tools help recapture lost value by identifying where materials are coming from and where they are going. They can help pinpoint excess suppliers handling products and unnecessary brokerage across the supply chain. Chemical companies and Accenture posit that digitization and transparency could unlock up to $550Bn in value for their supply chains.

Risk Mitigation from Geographic Concentration

Transparency and traceability tools help determine where suppliers' warehouses and manufacturing sites are located, highlighting potential geographic concentrations that could pose climate-related risks. For example, if an area is prone to natural disasters, such as fires or floods, geographic diversity of suppliers would help create resiliency. This also helps eliminate single supplier bottlenecks that can disrupt or delay production. A briefing from Brad and Dunstreet identified that over 90% of Fortune 1000 companies had one or more Tier 2 suppliers in the Chinese regions affected by COVID-19.

Risk Mitigation from Compliance

Transparency and traceability can help companies achieve sustainability certifications, adhere to industry standards and verify sustainability and fair labor claims. Traceability of controlled commodities such as conflict minerals have already moved major companies, such as Intel and Apple, away from high-risk suppliers and regions.

Increased Consumer Engagement

Transparency and traceability tools provide companies with more touch-points with their consumers, increasing trust in their products and production processes and driving brand loyalty. For example, companies can use product codes for digital communication and brand storytelling, shedding light on the journey of a t-shirt from an organic cotton farm in India to a store in New York City.

Validation of Authentication and Anti-Counterfeiting

Transparency and traceability tools can help eliminate unauthorized resale of products in the grey or black market. For luxury brands, intellectual property (IP)-sensitive products and the pharmaceutical industry, this has particularly meaningful value.

Where do transparency and traceability solutions integrate in the supply chain?

Where do transparency and traceability solutions integrate in the supply chain?

Garbage in, garbage out.

In order for transparency and traceability tools to work across complex supply chains, companies need to pull in high-quality, accurate and useful data. To do this well, companies need to ask themselves what kind of data they need from their product supply chain to accurately convey the journey of their products, and how to incentivize fragmented operators to input accurate data into their systems. Closed Loop Ventures Group has outlined three primary categories by which transparency and traceability tools can typically be segmented according to where and how they integrate across supply chains, but there are many nuances around how startups approach this space:

First-Mile
The benefits of deploying transparency and traceability tools start at the first-mile of the supply chain, or at the point of production. Here, a core component is understanding what data to collect and how to collect it. For example, agricultural commodities often entail the most complex first-mile data and require thoughtful approaches to easily incorporate individual farmers into these supply chain initiatives. Explore the case study (see pg. 16) about our portfolio company, Ucrop.it, to understand why accurate first-mile data is a critical piece of the puzzle for the food and agriculture industry.

Point-to-Point
Transparency and traceability can also result from simply digitizing pre-existing connections between two or more supply chain players. The value derived from point-to-point integration of these tools is different depending on which points of the supply chain are involved. For example, significant value can be generated by digitizing logistics and transportation within supply chains. Explore the case study (see pg. 17) about our portfolio company, TradeLanes, to understand how this can be applied in global trade to reduce error rates, create value, and generate transparency.

End-to-End
Transparency and traceability tools commonly include digitizing and mapping all suppliers and real-time flow of products moving through the supply chain, from first-mile through to the end consumer. The value derived from end-to-end tools relies heavily on the quality of first-mile and point-to-point data, and the value is often long-term and related to overall strategy, including identifying unforeseen risks in supply chains and communicating product traceability to the end consumer.

How do transparency and traceability solutions actually track and trace products?

How do transparency and traceability solutions actually track and trace products?

Blockchain can be a sledgehammer, and sometimes, all you need is a screwdriver.

There is an impressive diversity of new technologies that 1) physically tag products, and 2) digitally record events and transactions through the product's lifecycle. Closed Loop Ventures Group has identified that products moving through supply chains are typically tracked on the following levels:

Lot-Level: By the pallet of an aggregated commodity or raw material; this is often how food is traced.

Item-Level: By individual items or products, which each bear a unique tag.

The type of tag can be an off-the-shelf technology (e.g., RFID, QR, NFC, Bluetooth and others) with slight modifications to fit the tag to the product or use case. Or, the tag can be novel: some innovations leverage modified DNA, dust cultures, or ultraviolet (UV)-legible watermarking applied uniquely to products. Novel tags often require new scanning technologies deployed within the supply chain, and this can come at a high capital expenditure to the business implementing the system. Lastly, some innovations leverage pre-labeled, pre-existing tags combined with existing datasets to generate lot- or item-level tagging. Closed Loop Ventures Group has seen this occur in two ways:

SKU Serialization
By the assignment of a unique serial number to each product, independent of a certain batch or production run; this can be obtained by multiplying the number of SKUs by the quantity of product in each SKU and attaching that to the barcode on the product.

Digitizing Existing Data
By transitioning pen and paper records, such as existing sales history data, to digital records (e.g., a CSV or excel file) used to generate item-level traceability.

How do transparency and traceability solutions actually track and trace products?

Any physical tag needs a digital ledger. Some technology innovations in this space approach the problem by building entirely new data infrastructures or blockchain ledgers. While these solutions can be deployed effectively for certain use cases, neither bespoke platforms nor blockchain are a prerequisite for transparency and traceability. Blockchain is often more powerful of a tool than is needed to generate the basic levels of transparency in a supply chain. Immutable and decentralized ledger systems may have the highest value when being used to host anticounterfeiting data or enable smart-billing or financial transactions. However, not every use case for supply chain transparency or product traceability will need these elements. For example, fundamental mapping software and an accurate list of suppliers are perfectly suitable inputs to help identify geographic bottlenecks and therefore climate-related risk in a supply chain. These elements can be hard to gather, and the "blockchain" buzzword for how to record the data can distract from the more meaningful data itself.
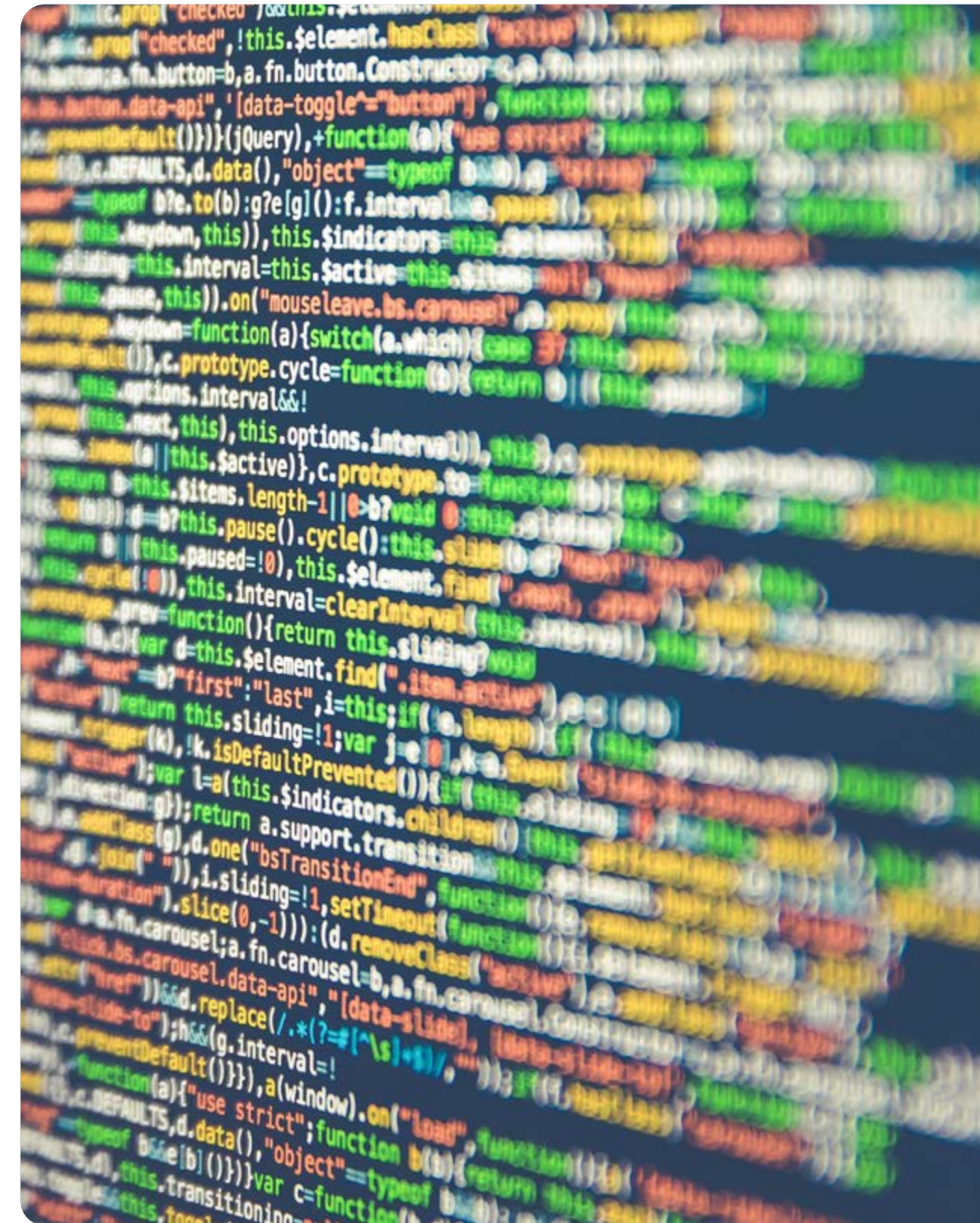
What needs to be true for transparency and traceability solutions to be successful in the market?

What needs to be true for transparency and traceability solutions to be successful in the market?

Closed Loop Ventures Group posits there are 4 key elements to create a successful transparency and traceability tool.

Focus on a Specific Industry

The respective size and nuances of the food, fashion and consumer goods industries require solutions that align specifically with the needs of each of their supply chains. Broader, cross-industry applications of transparency platforms or traceability technologies can, purportedly, unlock scalability more quickly. However, interoperability across industries is a bonus rather than a requirement. These industries are deeply interrelated (e.g., on-farm traceability of cotton and soy together can produce commodities for both the food and fashion industries). Yet, each industry is sufficiently large enough to sustain long-term growth of a transparency and traceability solution, and sector expertise is a prerequisite for initial traction, given the complexity of supply chains.

Incorporate Both First-Mile Integration and End-to-End Visibility

The system cannot have quality end-to-end visibility without high accuracy of useful first-mile data. Accurate, verifiable first-mile or point-to-point data underpins the integrity of the entire system's transparency and traceability. To have high-quality insights that inform strategy and nimble decision-making in times of crisis, solutions must ensure that the analytics use real-time and accurate data. Often, solutions do not have access to first-mile data, or it may simply not exist yet—especially in supply chains for raw material commodities. In these cases, companies creating transparency and traceability solutions may build tools themselves that digitize on-farm or raw material inputs to a supply chain. Explore the case study (see pg. 18) about our portfolio company, AMP Robotics, to see how their automated data capture creates a verifiable record for recycled commodities.

Integrate With Readily Accessible Data and Leverage APIs

Data challenges exist for point-to-point solutions as well. These solutions do not need to have novel or overly complex tagging or scanning. Generic, instead of bespoke, tags can create interoperability and require limited retrofitting in the supply chain. Integration should not require significant capital expenditure or extensive manual data entry—each would erode the economics of the system. Managing supply chain transparency by transaction data alone can be sufficient.

Differentiate on Channel to Market

As outlined in this landscape, there are many technologies aiming to provide transparency and traceability. The use cases for each technology differs depending on the brand or corporation using the transparency and traceability solution. Given the breadth of technology types and diversity of use cases, a single type of IP for the technology, integration or ledger is unlikely to provide a fully defensible solution. Therefore, how a transparency or traceability solution acquires customers (i.e. brands and corporations) and at what cost are the defining features of which solutions will win in the market.

How Transparency and Traceability Tools Play Out in the Field

This section shares a landscape mapping of the transparency and traceability space, and highlights some of Closed Loop Ventures Group's portfolio companies operating in the space. Each of these companies is on the ground enabling greater efficiencies through their tools.

Technologies in the Transparency and Traceability Landscape

Closed Loop Ventures Group has witnessed a proliferation of innovations in the space, as companies seek to meet the growing demand for transparency and traceability tools.

Disclaimer: Closed Loop Ventures Group developed this landscape based on publicly available data found on the websites of featured companies. Given the rapid evolution of this space, this landscape is non-comprehensive and subject to change.

Legend:
- FIRST-MILE FOCUS
- POINT-TO-POINT
- CONSUMER ENGAGEMENT FOCUS
- END-TO-END
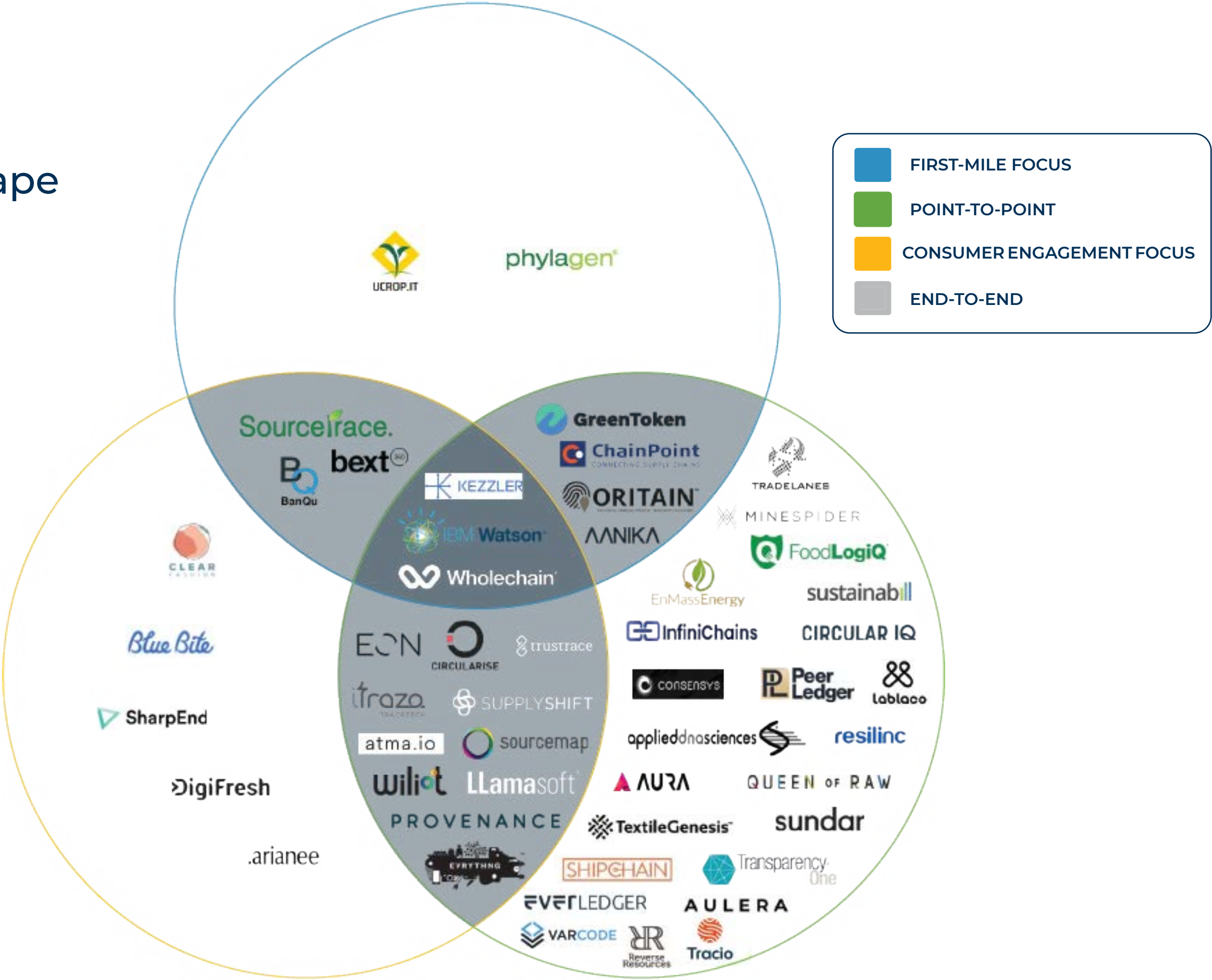
UCROP.IT

UCROP.IT's business model and technology solution incentivizes high quality, farm-level data collection to drive transparency through the agriculture industry.

Both brands and consumers need high-quality, farm-level data to make informed decisions about commodity and produce purchasing. This data has been historically hard to collect or generate, as on-farm sensors are often expensive for farmers and may not provide the data that matters most to a buyer. UCROP.IT developed a blockchain-enabled platform—accessed as a desktop software and mobile app—that registers event-driven crop cycle data directly from farmers through photos, to drive transparency through the value chain. Farmers capture on-field events such as soil preparation (tilling), seed planting, fertilization, irrigation, weeding, harvest, cover crop installation and decommissioning. This evidence can support regenerative agriculture claims and help farmers receive higher value for their crops as a result of implementing more circular farming practices, such as utilizing compost on-field. The compilation of these registries creates a real-time data package that makes the traditionally opaque process of farming now visible to multiple parties in a verified format (immutable blockchain records). This blockchain-enabled platform creates remote transparency and lays the first-mile data foundation for technologies that track & trace sustainably-produced crop commodities through the supply chain.

TRADELANES

TradeLanes' technology digitizes the reams of manual paperwork & sticky-note task management systems currently used when shipping containers to destination to enable efficiencies.

TradeLanes' software can be considered a full-service platform for trade execution, like a "TurboTax for global trade compliance." TradeLanes generates ROI for container shippers by (1) reducing the time required for the execution of a transaction by up to 80%, plus (2) reducing the instances and costs of correcting errors, where document error rates are often over 60%, and finally, (3) shortening the time it takes to get paid (trade-to-cash cyle). When applied to the sale of commodities, such as grain or dairy, TradeLanes' efficiency improvements also help to reduce food waste from late cargo. This digital point-to-point solution has immediate commercial value-add for exporters: fewer pen-and-paper errors mean more efficient transactions, and therefore, more business value. The process of digitizing formerly analog paperwork has a cascading effect—it also helps shippers track products and commodities as they move through the logistics system, and it creates secondary transparency that impacts the downstream supply chain.

AMP ROBOTICS

AMP Robotics is a coupled artificial intelligence (AI)-enabled vision system and robotic arm that sorts targeted materials at materials recovery facilities (MRFs).

A challenge in the recycling industry is uncertainty about the purity and quality of recycled materials that are sorted at MRFs. AMP Robotics's vision system and related data on tracked materials could create a step change in creating accurate and transparent accounts at the MRF level, on how clean recyclable materials are before they ever leave the facility. This could potentially result in increased pricing for commodities by end markets demanding clean materials. Further, the core vision technology could enable the development of "curated" bales of recyclable material, where higher-value formats are maximized and less-desirable materials are removed. In addition to potential benefits enabled by the vision system, the robotic sortation process can offer greater material throughput and improved efficiency relative to manual methods. Because MRFs represent an early, critical node in circular supply chains, AMP Robotics's solution offers new automated ways to unlock key material data that can have positive, cascading effects on downstream supply chain stakeholders that will clean, process, and incorporate recycled material into new products and packaging. This new process has the potential to help usher in a far higher degree of transparency compared to historical practices.

The Circular Advantage: Looking Ahead

It is an amazing feat that our global supply chains can move materials over long distances and through complex supplier networks to meet growing global demand for a variety of products. Technological advancements, alongside current, unprecedented market forces support the adoption of supply chain transparency and product traceability on a much wider scale. Consumers are demanding it, and our supply chains are better with it.

Near-term and immediate economic value can be created by implementing point-to-point solutions across industries that digitize and automate processes. Amalgamating point-to-point solutions secondarily starts to generate transparency and traceability. Synergies between the existing Closed Loop Ventures Group portfolio companies and additional point-to-point solutions will continue to yield increased visibility and agility.

In the long-term, pre-competitive collaborations and industry consensus can connect the lines between these dots. These types of partnerships are already beginning to form throughout industries as more supply chain managers recognize how critical transparency and traceability are to business continuity. Collaboration between stakeholders will result in industry-specific, end-to-end supply chain transparency, driven by high-quality first-mile data and a differentiated channel to market serving brands and corporations.

Transparent supply chains and traceable products will help realize value, hedge against increasing risk and volatility, and reduce waste and inefficiency. **Join us as we work to shape our supply chains to be more resilient, more equitable, and more circular.**

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CONTACT

If you're interested in learning more about Closed Loop Ventures Group, visit our website and get in touch with us directly at admin@closedlooppartners.com with any questions.

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