

apparel alliance

THE CONNECTED SUPPLY CHAIN JOURNEY:

From Groundwork to Impact

Assessing progress and opportunities for greater connectivity across the apparel alliance's tools and programs

EXECUTIVE SUMMARY

The apparel alliance is a collaborative industry working group uniting four global organizations:

apparel impact institute · Cascale · Textile Exchange · ZDHC

Through joint action, shared knowledge, and aligned goals, the apparel alliance works to drive greater impact and credibility throughout the global supply chain.

The textile, clothing, leather and footwear (TCLF) industry has long faced a fragmented landscape of sustainability initiatives. Different standards, tools, data systems and customer requirements have evolved to meet legitimate needs, but also created complexity, duplication, lack of clarity and additional resource burden for brands and suppliers. The apparel alliance recognizes that the tools and programs developed by its four organizations have contributed to this challenge. Since its establishment in 2020, it has sought to address this challenge by strengthening complementarity across the organizations' work and creating the groundwork for a more connected approach, with the ambition of demonstrating how greater connectivity could work across the wider industry. The apparel alliance refers to this effort as the "connected supply chain journey", with the ultimate objective of enabling more resources to go toward on-the-ground improvement and impact.

Research undertaken for this report found meaningful progress toward this vision, particularly in relation to sustainability data. The apparel alliance's Data Working Group has established the groundwork for greater data consistency and interoperability, including the Supply Chain Taxonomy and alignment of underlying data used for impact calculations. The Data for Due Diligence project demonstrates how existing tool and program data can be better utilized, while a recent collaborative project between Cascale and ZDHC shows a promising example of progressing from common data requirements toward joint verification. Other collaborations demonstrate how individual apparel alliance organizations' expertise, tools and programs can complement one another across different tiers of the supply chain.

At the same time, stakeholder interviews highlighted a central finding: technical data alignment does not automatically translate into a more streamlined experience for brands and suppliers. Brands and suppliers continue to experience resource burden from navigating overlapping requirements, collecting and reconciling data across different systems, and managing duplicative assessment. Greater interoperability therefore requires connectivity beyond individual data points, including definitions, scope, methodologies, reporting periods, guidance and verification.

The next phase of the apparel alliance work presents an opportunity to build on the groundwork already established and ensure the organizations' collaboration translates into practical user benefit and impact. The report identifies seven priorities: align by design; measure alignment through user benefit; deepen interoperability and data sharing; extend alignment across the wider industry; extend the connected approach to more sustainability topics; turn efficiency into on-the-ground improvement and impact; and strengthen stakeholder engagement. Ultimately, a connected supply chain does not require a single sustainability system. It requires a specialist ecosystem that works coherently, allowing existing information and work to be recognized and shared where appropriate. This can help reduce duplication and enable more resources to be directed toward on-the-ground improvement and measurable impact.

A connected supply chain is an aspiration but ultimately, a means to an end – a coherent system that enables information to flow easily, minimizes duplication and frees up more resources for on-the-ground improvement and impact.

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ABOUT APPAREL ALLIANCE

The apparel alliance is a collaborative industry working group uniting four global organizations: Apparel Impact Institute (Aii), Cascale, Textile Exchange, and ZDHC. Through joint action, shared knowledge and aligned goals, the apparel alliance works on a pre-competitive basis to drive greater impact and credibility throughout the global supply chain. The group was established upon calls from the industry stakeholders for the organizations to collaborate more closely and reduce duplication of effort.

Early on its journey, the apparel alliance connected around the message shared in the Roadmap to Net Zero Report, developed by the World Resources Institute and Apparel Impact Institute, which identifies six key interventions for the textile, clothing, leather and footwear (TCLF) industry to achieve a 45% reduction in greenhouse gas (GHG) emissions by 2030[1]. Since then, while the apparel alliance's shared understanding around this goal remains, the scope of the organizations' work has been progressively broadening as some areas of their work intersect and evolve, and the apparel alliance looks toward more aspirational topics, such as delivering beneficial outcomes for climate and nature.

The apparel alliance brings together dedicated representatives from each of its four organizations who meet monthly to set annual priorities and coordinate and oversee joint projects, with decisions made collectively by consensus. It draws on the established governance structures, stakeholder engagement mechanisms and extensive networks of its individual organizations, while its relatively lean structure enables it to coordinate joint activities with agility.

ABOUT THIS REPORT

This report explores how the apparel alliance's work is contributing toward more clarity, reduced duplication and better flow of information among its organizations' tools and programs – a more "connected supply chain journey". It highlights progress to date, ongoing collaboration and challenges, existing opportunities the apparel alliance is exploring, as well as further opportunities for the next phase of the apparel alliance's work. It draws on research undertaken between February and August 2026, including mapping and analysis of the apparel alliance organizations' tools and programs, review of relevant joint initiatives and industry literature, interviews with apparel alliance organizations, as well as a sample of brands and suppliers.

The accompanying appendices provide the detailed Connected Supply Chain Map and further information on the research methodology and stakeholder engagement. The report is primarily intended for brands, vendors, suppliers and assessors, while also providing insights relevant to the wider industry.

1 The methodology was adjusted in the subsequent progress reports titled Taking Stock of Progress Against the Roadmap to Net Zero, resulting in one intervention being split into two, and therefore the subsequent reports referring to seven interventions instead of six.

1. INTRODUCTION: THE NEED FOR A CONNECTED APPROACH

The industry has long faced a fragmented landscape of sustainability tools, programs and reporting requirements. Different standards, tools, data systems and customer requirements have evolved to meet legitimate needs, but this complexity has also created significant duplication, lack of clarity and additional resource burden for brands and suppliers. The existing tools and programs do not always use consistent approaches to defining, measuring and reporting sustainability information, requiring substantial time and resources to collect, reconcile and verify data that could otherwise be directed toward on-the-ground improvement and impact.

What resource burden looks like in practice

Interviews with brands, suppliers and the apparel alliance organizations carried out as part of the research for this report identified three recurring sources of this burden, with practical implications extending beyond additional time and cost:



NAVIGATING COMPLEXITY – The resource burden begins before data is collected or assessments take place. Interviewed brands and suppliers described the time required simply to navigate the landscape: understanding the similarities and differences between tools and programs, why those differences exist, which requirements apply or should be prioritized, and where existing information may be recognized and reused. Beyond the time involved, unexplained overlaps and inconsistencies can undermine confidence in the information being generated and make it harder to use for decision-making. One interviewed brand explained that until the landscape is clearly understood, leaders may be reluctant to approve sustainability budgets and implementation programs, delaying resources from being directed toward impact.



COLLECTING AND RECONCILING DATA – Collecting accurate sustainability data can require time, expertise and investment, resulting in a financial cost. Currently, many organizations still collect similar data independently, without the ability to readily reuse it across different tools and reporting requirements. Due to differences in approaches, even where similar data already exists, it may first need to be adjusted for specific requirements such as scope and timeframe, before it can be reused further. As a result, some suppliers are investing significant resources in sustainability data infrastructure to manage this challenge. One interviewed supplier reported investing approximately €300,000 in software and hardware to enable accurate sustainability data collection and consolidation in its operations across different reporting requirements, in addition to substantial annual expenditure on sustainability programs, audits and certifications.



ASSESSMENT AND VERIFICATION – Duplicative audits and certifications were repeatedly highlighted as a significant burden, particularly for suppliers. Interviewed suppliers described the challenge of absorbing these costs alongside rising operating costs and continued commercial pressure. One interviewed supplier reported maintaining approximately 45 certifications and spending around 200 days each year on auditing and certification requirements. These findings are consistent with wider industry research, including STAR Network's Addressing Audit Fatigue and the Transformers Foundation's Fashion's Chemical Certification Complex, which highlight the financial cost and human resource burden stemming from overlapping audit, testing and certification requirements. While smaller suppliers may face fewer audit and certification requirements than larger suppliers, limited internal capacity and resources can mean that the relative burden remains significant.

Taken together, these findings point to substantial resources being absorbed before meaningful on-the-ground improvement takes place — in navigating requirements, collecting and reconciling data, and undergoing assessment and verification. The research did not quantify how resources are distributed across these activities compared with action planning and on-the-ground improvement activities, but stakeholder interviews indicate that the burden associated with these foundational activities remains significant. Greater connectivity therefore presents an opportunity not only to improve efficiency, but to help redirect time and resources toward taking action and creating positive impact.

It is also important to recognize that raw material production systems (Tier 4) operate under different conditions and face distinct challenges from manufacturing facilities. Collecting data and demonstrating improvement at farm level requires approaches that consider the diversity of production systems, the local nature of environmental and social outcomes, and the varied resources and incentives available to producers. Approaches to connectivity at Tier 4 must therefore reflect the realities of raw material production and the needs of those working at source.

Beyond the resource burden: data quality, compliance and confidentiality



DATA QUALITY AND COMPLIANCE – Interviews with brands highlighted the relationship between greater consistency, data quality and regulatory compliance. While suppliers often carry much of the operational burden associated with data collection and assessment, brands may ultimately be responsible for using this information to meet reporting requirements and substantiate sustainability claims. Where definitions, methodologies, scope and calculation boundaries differ, information can be more difficult to interpret, compare and substantiate. As regulatory requirements around sustainability reporting, due diligence and environmental claims evolve, the quality and reliability of underlying information are therefore becoming increasingly important.



DATA CONFIDENTIALITY – Interviews also emphasized suppliers' concerns about sharing information needed for accurate sustainability data tracking, where doing so may also reveal commercially sensitive information. For example, information about production volumes, capacity, efficiency, resource consumption, buyer relationships or sourcing is commonly perceived as commercially sensitive by suppliers, as it can reveal details about their operations, commercial relationships and competitive position that they may not wish to disclose more widely. These concerns become particularly important as data is increasingly shared and reused across different tools, platforms and stakeholders. A more connected approach therefore needs to consider not only how data can flow more easily, but also appropriate access, permissions and protection of confidential information.

The apparel alliance recognizes that the tools and programs developed by its four organizations have contributed to this complexity. Since its establishment in 2020, it has sought to address this challenge by strengthening complementarity across their work and creating the groundwork for a more connected approach among the four organizations, with the ambition of demonstrating how greater connectivity could work across the wider industry. The apparel alliance refers to this effort as the "connected supply chain journey".

WHAT IS A CONNECTED SUPPLY CHAIN?

A connected supply chain is one in which sustainability tools and programs across the TCLF supply chain work together as parts of a coherent system, creating a more seamless experience for brands and suppliers.

While these tools and programs are developed and managed by different organizations, they use more consistent terminology, definitions and approaches, enabling information to flow easily between them and existing work to be recognized, trusted, accepted and shared where appropriate. This reduces confusion, duplication and unnecessary effort, ultimately freeing more resources for creating impact.

A fully connected supply chain is an aspiration rather than today's reality. Achieving it will require progressive collaboration across the wider industry ecosystem, with the apparel alliance organizations working together on a pre-competitive basis to contribute to this vision within their scope of work.

A connected supply chain is an aspiration, but ultimately, a means to an end – a coherent system that enables information to flow easily, minimizes duplication and frees up more resources for on-the-ground improvement and impact.

2. THE FOUNDATIONS OF A CONNECTED SUPPLY CHAIN

In its six years of collaboration, the apparel alliance has established important groundwork for a connected supply chain journey across its organizations' own tools and programs, further explained below: use of complementary expertise and greater data alignment. These foundations provide the basis from which more practical connectivity between tools and programs can develop.

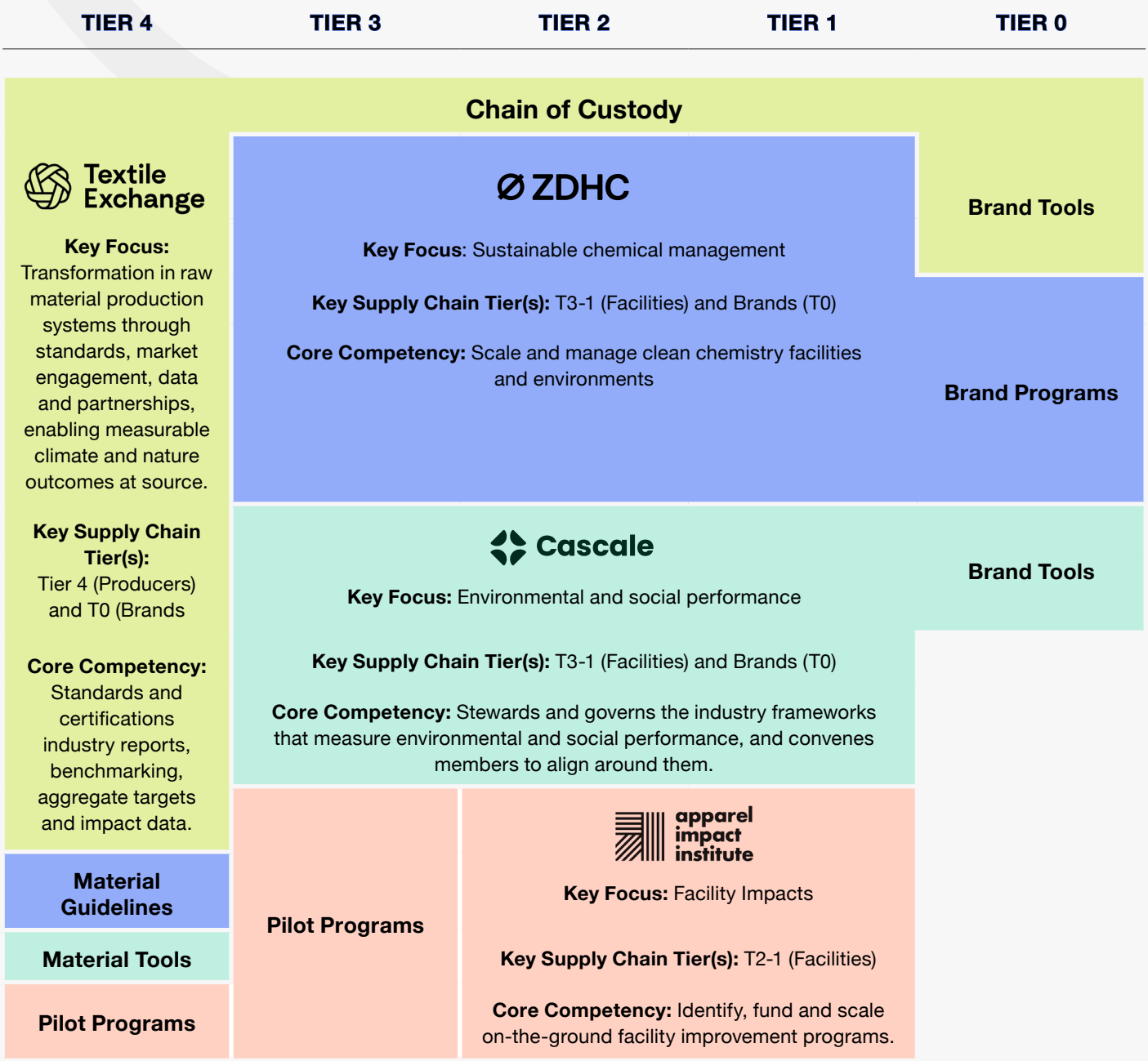
This section discusses the work already completed by the apparel alliance organizations. In some cases, while the work is established, it still requires ongoing collaboration and advancement.

Use of complementary expertise

There is an inherent complementarity among the four organizations based on their individual missions, expertise and positioning within the industry. As Visual 1 illustrates below, each organization brings distinct areas of expertise, with a focus on specific topics and parts of the supply chain. These "swim lanes" are not rigid boundaries. Rather, they highlight areas of primary contribution while enabling deliberate connections between the organizations' tools, programs and expertise. In practice, the apparel alliance organizations "point to" one another frequently to reinforce these areas of expertise. Together, the four organizations have a presence across all stages of the TCLF supply chain.



Image: Devn



Visual 1: Overview of apparel alliance organizations' focus areas, core competencies and presence across the supply chain.

Aii's specific role extends beyond assessment and data into on-the-ground improvement, supporting facilities across the pathway, including facility screening and benchmarking, action planning, implementation, monitoring and reporting. This on-the-ground improvement focus complements the tools and frameworks of the other apparel alliance organizations by helping translate identified opportunities into facility-level action. For instance, this complementarity can also be seen in Cascale's Manufacturer Climate Action Program (MCAP) and Aii's facility screening and action planning, which operate at different but connected levels. MCAP supports manufacturer-level climate strategy, direction and target setting, while Aii's facility screening and action planning use facility-level data and technical diagnosis to identify improvement priorities. The relationship can create a two-way feedback loop, with manufacturer-level strategy guiding facility action and facility-level insights informing and refining broader strategy.

As the industry expands its focus into broader topics such as circularity, connecting these different areas of expertise early becomes increasingly important. Textile-to-textile recycling provides one example. Textile Exchange's recent polyester Life Cycle Assessment study provides impact data for virgin and recycled polyester and helps identify environmental hotspots across different recycling pathways, whereas ZDHC brings complementary expertise on chemical management associated with recycling processes. This illustrates how sustainability issues can cut across existing areas of expertise and reinforces the value of connecting these perspectives from the outset, when industry approaches are developed.

Building better data alignment

Data alignment has been a major area of work for the apparel alliance, reflecting the fact that data underpins all aspects of sustainability, from measurement and decision-making to action across its organizations' tools and programs.

The challenge that data alignment is working to address is that different approaches to describing, measuring and reporting sustainability data have developed across the TCLF industry. These approaches have evolved to meet different organizational objectives and growing stakeholder and regulatory expectations, leading to differences in terminology, definitions, scope, calculation boundaries and methodologies. As a result, information can be difficult to compare and use across systems.

The consequences go beyond inconsistency. Where equivalent information cannot be readily identified, compared and trusted, brands and suppliers may be asked to collect and provide similar information multiple times, leading to duplication of effort and additional time and financial burden. Differences between systems can also make it harder for stakeholders to track progress and determine which existing information can be recognized and shared.

To support a varied and evolving landscape, the apparel alliance's approach is not to create a single universal tool, but to establish a common language that enables different specialist systems to work together.

CASE STUDY 1: THE APPAREL ALLIANCE DATA WORKING GROUP

The Data Working Group is an important mechanism through which the apparel alliance organizations build greater data connectivity and interoperability across their tools and programs. It provides a platform to collaborate on current and emerging data alignment opportunities, as well as to maintain existing connections as tools and methodologies evolve. This ongoing role is important: data alignment cannot be treated as a one-off exercise, as changes to methodologies, datasets and tools require continued coordination and resources to maintain consistency. For example, the group enables the four organizations to flag to each other when updates to their tools are carried out and facilitate peer review, helping to ensure changes do not unintentionally create new gaps or overlaps.

Key outputs of the Data Working Group to date include:

- **Supply Chain Taxonomy –** While supply chain tiers are widely used across the industry, differences in definitions and how activities are classified can lead to inconsistencies in data and impact calculations. For example, the same production process may be assigned to different tiers by two different stakeholders, potentially affecting GHG emissions modeling or supplier disclosure. The Supply Chain Taxonomy addresses this by establishing a common classification and terminology for the TCLF supply chain, providing a shared reference for the apparel alliance, as well as the wider industry. The first edition established a common framework, while the second introduced greater granularity, including more detailed process classifications, clearer process boundaries and improvements addressing overlaps and classification gaps identified through use of the original framework.
- **Sharing data for impact calculations –** Aligning the underlying data used in impact calculations is another important area of apparel alliance organizations' collaboration. Historically, differences in the material production volumes and sector allocations used by different organizations could lead to inconsistencies in their impact modeling. To address this, Textile Exchange annually shares its global fiber and materials production volume data and sector split estimates with ZDHC, Cascale and Apparel Impact Institute. Using the same underlying volume dataset provides a more consistent basis for GHG emissions modeling across the organizations, including in the Textile Exchange Climate+ Dashboard and Apparel Impact Institute's Roadmap to Net Zero Report (the foundational report released in 2021), as well as the annual Taking Stock of Progress Against the Roadmap to Net Zero reports, while Cascale provides the Higg MSI data used to model GHG impacts across these reports.

The group brings together data and reporting representatives from each of the four apparel alliance organizations, who meet monthly to address shared data challenges, while allowing individual organizations to retain their specialist tools and approaches. These foundations are not static and the Data Working Group continues to build on them by exploring how different components of data connectivity and interoperability can be advanced in practice, as explored in Section 3.

Utilizing existing information

Building a connected supply chain does not only depend on creating new connections between data systems. It can also involve recognizing and making purposeful use of guidance, expertise and information that already exists across the apparel alliance organizations.

CASE STUDY 2: RECOGNIZING ZDHC'S EXPERTISE AND UTILIZING EXISTING RESOURCES

The two examples below demonstrate purposeful connectivity and drawing on another organization's specialist expertise where relevant, rather than developing duplicative guidance or requirements.

ZDHC's MMCF and rPET Guidelines and Textile Exchange's Materials Matter Standard

Textile Exchange's core expertise lies in raw material production systems at Tier 4 of the supply chain. Connectivity at Tier 4 involves linking standards, chain of custody, production data and brand sourcing decisions.

Textile Exchange's Materials Matter Standard provides a unified framework across materials, intended to support improved production practices and outcomes while simplifying requirements for the market. The Materials Matter Standard focuses on raw material production, with requirements also extending into primary processing, which is why Textile Exchange has drawn on ZDHC's specialist chemical management expertise and existing industry guidance rather than developing duplicative requirements.

This is particularly relevant to recycled synthetic fiber production, where some chemicals serve as essential inputs and cannot readily be substituted with safer alternatives. In these areas, the standard references ZDHC's existing Fibre Guidelines, covering chemical management, solvent recovery, controlled effluent discharge and emissions management, and recognizes ZDHC certificates demonstrating implementation of the relevant guidelines and their performance levels as evidence toward meeting the relevant requirements of the standard.

ZDHC's tools and Cascale's Higg FEM

Similarly, ZDHC tools form the basis for the chemical management data collection and measurement in Cascale's Higg Facility Environmental Module (FEM). The Higg FEM questionnaire asks about conformance with the ZDHC Manufacturing Restricted Substances List (MRSL), Wastewater and Sludge Guidelines, Air Emissions Guidelines and the ZDHC Chemical-related Waste Management and Disposal Framework.

Sometimes, however, even where relevant sustainability data already exists, it can be difficult for brands and suppliers to understand what it means and how it can be used together. Helping to connect existing information can reduce the need to repeatedly interpret or collect similar data and help translate it into more coordinated action for improvement as demonstrated below.

CASE STUDY 3: DATA FOR DUE DILIGENCE PROJECT

Data for Due Diligence Project is the result of a collaboration between Cascale, Apparel Impact Institute and ZDHC. It provides solutions for better facility-level data usability and addresses audit fatigue and fragmented sustainability practices at two levels:

- The Data Matrix maps data already collected through the three collaborators' tools and programs against key sustainability topics, helping companies understand what relevant information about their suppliers already exists and where to find it, rather than independently working out how disparate data sources fit together. The Matrix is primarily an informative resource, supporting the data collection and assessment stage of due diligence by helping companies navigate and make use of existing information, while enabling companies to integrate it into their internal processes as needed. It does this by acting like a translation mechanism between the three organizations' data.
- The Facility Improvement Journey goes a step further, providing an informative as well as practical tool that helps users consolidate their relevant facility data from the three collaborators' tools and programs, identify performance gaps and priorities, and understand which improvement programs can support those areas. It therefore provides a ready-made tool, which can be applied at facility level.

The project included a pilot with stakeholder participation, which generated encouraging feedback on the potential for the two outputs to contribute to greater clarity, transparency and data-driven decision-making.



Image: Madeleine Brunnmeier

3. FROM FOUNDATIONS TO PRACTICE: CONNECTIVITY UNDERWAY

The research highlighted that technical data alignment does not automatically translate into a more streamlined experience for brands and suppliers. For connectivity and interoperability to deliver its intended benefits, it ultimately needs to reduce the time, cost, complexity and uncertainty experienced by the people using the relevant systems.

Interviewed brands and suppliers stressed that interoperability requires more than connecting individual questions. Differences in definitions, scope and boundaries, calculation methodologies, reporting periods, implementation guidance and verification approaches can all prevent otherwise similar information from being directly compared, trusted or reused. This is particularly important as regulatory expectations for sustainability reporting continue to increase and brands need confidence that information collected through different sources is sufficiently consistent and credible to support decision-making and demonstrate progress.

Building on the foundations explained in section 2, the apparel alliance organizations have been taking concrete steps toward greater connectivity in a number of priority areas. This section highlights the work which is already established, currently being advanced, and at an exploratory stage.

Advancing different components of data connectivity and interoperability

The Data Working Group's activities form part of a broader progression toward greater data connectivity and interoperability across the apparel alliance organizations' tools and programs. While some concrete projects have been completed, the group's work is ongoing: existing connections need to be maintained as tools and methodologies evolve, with opportunities are being advanced and others remaining at an exploratory stage.

Data connectivity and interoperability include several components and progress across these components is at different stages. Visual 2 illustrates the different components involved, alongside examples of work already established, underway or being explored across the apparel alliance. Importantly, individual projects represent only examples of activity within each component rather than its full scope. For example, progress on recognition between specific verification approaches does not mean that opportunities for greater verification recognition across other relevant tools have been exhausted. The collaboration between Cascale and ZDHC is simply one promising example already underway.

COMPONENT	WHAT IT INCLUDES	OUTPUT/ EXAMPLE	STATUS
1. Common Language	Common terminology, definitions and classifications.	**Supply Chain Taxonomy** – provides a common reference for tools, programs, calculations and reporting.	Established & continuing
2. Data Input for Calculations	Calculation methodologies, assumptions and underlying data sets.	**Shared impact data** – Textile Exchange production volume and sector split data shared for use in impact modelling.	Established & continuing
3. Data Points and Requirements	Data points (assessment questions), scope, boundaries, units and reporting periods.	**Aligning data points** – identifying and connecting equivalent questions and data points across tools, such as ZDHC Supplier to Zero and Cascale's Higg FEM.	In progress
4. Data Recognition and Reuse	Recognition and reuse of existing sustainability data across tools and programs.	**Data for Due Diligence** – identifying how information already collected through existing tools and programs can be used together.	In progress
5. Data for Joint Verification/ Recognition	Evidence requirements, verification approaches and recognition of existing verification.	**Cascale–ZDHC joint verification work** – exploring combined on-site verification to reduce duplication.	In progress
6. Data Sharing between Systems	Data formats, identifiers and technical connections that enable data to connect between platform systems.	Early-stage opportunities being explored. **Note:** Automatic data exchange between platforms is not currently being pursued due to technical, governance and resource considerations.	Being explored

Visual 2: Overview of different components of data connectivity and interoperability, with examples of relevant apparel alliance work and a high-level indication of progress within each component.

The research identified data sharing between different systems as one of the most challenging components to advance. Interviews with brands and suppliers highlighted a clear desire to reduce the number of tools and platforms they need to navigate. At the same time, interviews with the apparel alliance organizations highlighted that a simpler user experience should not necessarily require combining every sustainability topic into a single tool, platform or assessment. Different topics may require specialist expertise, different levels of data granularity and dedicated implementation processes. In addition, practical obstacles such as data confidentiality or paid access to third-party data platform providers mean that data sharing is one of the more complex and less advanced components of data alignment.

The opportunity is therefore to identify where stronger connections between specialist approaches can meaningfully increase data interoperability where requirements overlap across tools and systems, reduce duplication and simplify the user experience, while retaining the autonomy and specialization needed to support credible data and effective implementation.

Joint verification and recognition

Verification provides a particularly important test of whether greater data connectivity translates into practical user benefit. Even where data requirements become more consistent, different verification approaches can still require brands and suppliers to undergo separate assessments or provide evidence multiple times. Joint verification and recognition between relevant verification systems therefore represents an opportunity to translate technical connectivity into a more tangible reduction in user burden.

CASE STUDY 4: COLLABORATION BETWEEN CASCALE AND ZDHC

Collaboration between Cascale and ZDHC provides one of the clearest examples of alignment progressing from overlapping content and performance requirements across the Higg Facility Environmental Module and ZDHC Supplier to Zero V2 frameworks, toward a more streamlined assessment journey for suppliers. The organizations collaborated on referencing tools and guidance in their respective frameworks.

- **Cascale's Higg Facility Environmental Module (FEM) and ZDHC's Supplier to Zero V2** questionnaires reference relevant tools from both organizations across relevant chemical management, wastewater and air emissions requirements.
- **Cascale's Foundational Environmental Performance (FEP) and ZDHC's Supplier to Zero V2.** All Foundational Environmental Performance (FEP) questions reflected in the Higg FEM are in scope for Level 1 of ZDHC Supplier to Zero V2 as foundational requirements, bringing coherence across what is understood as 'foundational' across the two frameworks.
- **Cascale's Brand and Retail Module (BRM) and ZDHC's Brands to Zero reporting.** Brands completing the ZDHC Brands to Zero Leader Programme can use their results in the BRM questionnaire on sustainable chemical management and wastewater management questions, effectively avoiding double evaluation.

Building on this work:

- In 2024, Cascale and ZDHC announced a three-year strategic collaboration which includes working toward joint verification of the two assessment frameworks and ultimately establishing a mutual recognition model, as well as joint work on training and education. If successful, this could translate into a tangible reduction in the time and cost associated with duplicative verification. Among other activities, the project involves a thorough technical review of both organizations' assessment protocols in phase 1, carrying out combined assessment pilot and industry implementation in phase 2 and developing a mutual recognition model involving data sharing in phase 3.

Exploring opportunities for early connectivity

Not all opportunities for greater connectivity are equally advanced. For example, Aii and ZDHC are currently exploring an opportunity to better connect their respective work on energy and water efficiency, with the potential for more integrated approaches that balance environmental, operational, and economic considerations. The opportunity stems from the fact that these two topics are closely interlinked and working on them in silos could result in improvements in one area creating unintended trade-offs in the other.

The work remains in the exploration phase, but the organizations have already identified clear areas of complementarity, making the potential for greater connectivity promising. While still at an early stage, this provides an example of the opportunity to identify connections between organizations' respective areas of expertise before separate approaches become further established. Exploring complementarity early can help identify where approaches could work together and where potential trade-offs from the outset.

4. FROM CONNECTIVITY TO IMPACT: RECOMMENDATIONS FOR THE NEXT PHASE

The progress described in this report demonstrates that greater connectivity is both possible and valuable. The next phase of the apparel alliance's work presents an opportunity to advance these efforts more deliberately, measure success through the experience of users and ensure that efficiency gains ultimately release more resources for on-the-ground improvement and impact.

This section includes recommendations on how to act on the opportunities identified in the research:

1. **Connect by design –** The exploratory work around energy and water efficiency illustrates the value of identifying connections early, particularly where different areas of expertise intersect and actions in one area may have implications for another. As new projects and areas of work develop, the apparel alliance has an opportunity to establish complementarity from the outset, before separate approaches become embedded. This starts with identifying how each organization's expertise contributes to different or new areas of work, where responsibilities intersect and what common foundations will be needed. A connect-by-design approach can reduce the need to retrospectively reconcile tools, definitions and methodologies once they are already established.
2. **Measure connectivity through user benefit –** The ultimate test of connectivity should be whether it produces a tangible improvement for users. Technical milestones such as aligned terminology or mirrored questions are important, but the research demonstrates that these alone do not necessarily eliminate duplication in practice. The apparel alliance could increasingly assess connectivity among its tools and programs through outcomes such as reduced time, cost, repetition and complexity for brands and suppliers, while maintaining and improving data quality and credibility. Direct user testing and follow-up research could support this approach. Existing initiatives such as Data for Due Diligence provide opportunities to understand how tools are being used in practice and quantify their benefits, while the Cascale–ZDHC joint facility verification project could demonstrate how technical convergence translates into measurable reductions in audit burden.
3. **Deepen data interoperability –** The Data Working Group has established important foundations through common terminology, taxonomy and underlying datasets. The next opportunity is to progressively deepen connections across the different layers that determine whether information is genuinely interoperable. This includes alignment, where possible and appropriate, across scope and boundaries, methodologies, reporting periods, guidance, verification, recognition and data sharing, in addition to definitions. Specialist programs may legitimately require different levels of granularity for different purposes, so the objective should be to ensure that equivalent information can be identified, trusted and shared wherever appropriate, reducing the need for stakeholders to repeatedly collect or verify the same information. In order for this to happen, data governance and systems interoperability should be established first.
4. **Extend the connected approach across relevant sustainability topics –** While the apparel alliance's collaborative work has predominantly focused on climate and greenhouse gas impacts, there is an opportunity to apply the principles of connectivity across a broader range of sustainability topics, where relevant. Not every topic will be equally relevant to every apparel alliance organization, nor does greater connectivity require all four organizations to work on every issue. However, brands and particularly suppliers manage environmental, social and nature-related requirements as part of the same sustainability landscape. A truly connected supply chain journey should therefore progressively consider how all relevant sustainability tools, approaches and information can be better connected, helping to further reduce fragmentation and resource burden. While these tools operate in different contexts and will legitimately retain some different requirements, there may be opportunities for bilateral or multilateral collaboration between relevant apparel alliance organizations. This could be especially valuable for vertically integrated suppliers managing the full breadth of sustainability initiatives across multiple supply chain tiers.

5. **Extend convergence across the wider industry –** The benefits of better connectivity and convergence between apparel alliance organizations can only go so far, if other industry stakeholders continue to layer separate proprietary requirements on top of established industry approaches. Interviewees, particularly suppliers, repeatedly highlighted proprietary customer tools and requirements as a continuing source of duplication and therefore burden. Through their existing tools, programs and extensive networks, apparel alliance organizations could encourage greater recognition and adoption of aligned industry approaches. For example, relevant brand assessments or benchmarks could positively recognize or even request that companies adopt or recognize established industry tools rather than creating duplicative proprietary requirements. This could help make convergence itself a behavior that is recognized and rewarded.
6. **Turn efficiency into on-the-ground impact –** Longer-term sourcing commitments and greater commercial certainty can therefore play an important role in enabling suppliers to invest in sustainability improvements. This is particularly relevant at Tier 4, where the adoption of improved production practices often depends on producer economics, access to appropriate support, and whether market incentives adequately reward those improvements. Apparel alliance organizations could reinforce this by recognizing and rewarding responsible purchasing practices through relevant brand-facing tools and programs.
7. **Strengthen stakeholder engagement –** Interviews conducted for this research also highlighted the importance of direct brand and supplier input into apparel alliance-level projects, particularly where new approaches are intended for industry-wide adoption. While each organization has established stakeholder engagement mechanisms for their own projects, creating feedback opportunities around apparel alliance projects would allow proposed solutions to be tested directly with their intended users. Supplier participation is particularly important. The research repeatedly demonstrated that approaches that appear aligned in theory do not always reduce burden in practice. Involving suppliers in design, testing and implementation can help ensure that connectivity translates into tangible user benefit.



Image: Matt Artz

APPENDIX 1: CONNECTED SUPPLY CHAIN MAP

This detailed map provides a point-in-time overview of relevant tools and programs from apparel alliance organizations, identified through research into how they contribute to a connected supply chain journey. It groups tools and programs into broad categories, ordered to illustrate a possible journey from understanding a sustainability topic, through data collection and verification, to planning and implementing action and monitoring progress. This journey is not linear or prescriptive and may look different for each organization. The map also provides a snapshot of areas of complementarity, existing alignment and opportunities for further convergence, which are explored further in the main text of the report.

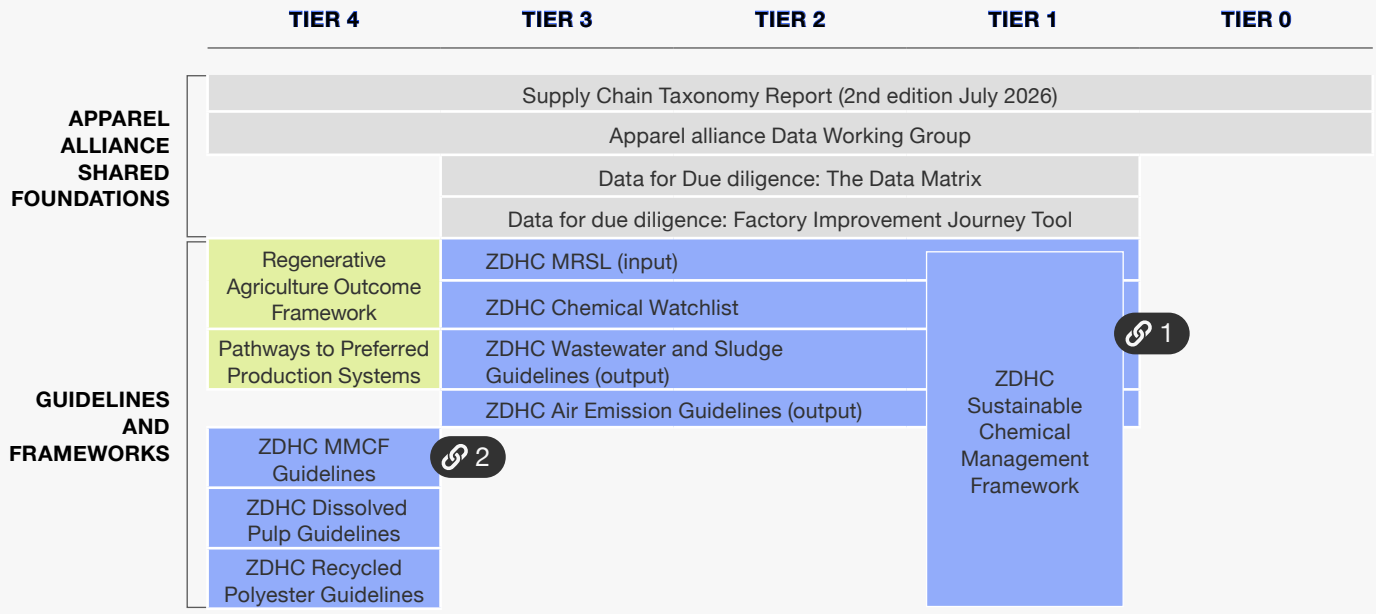
LEGEND:

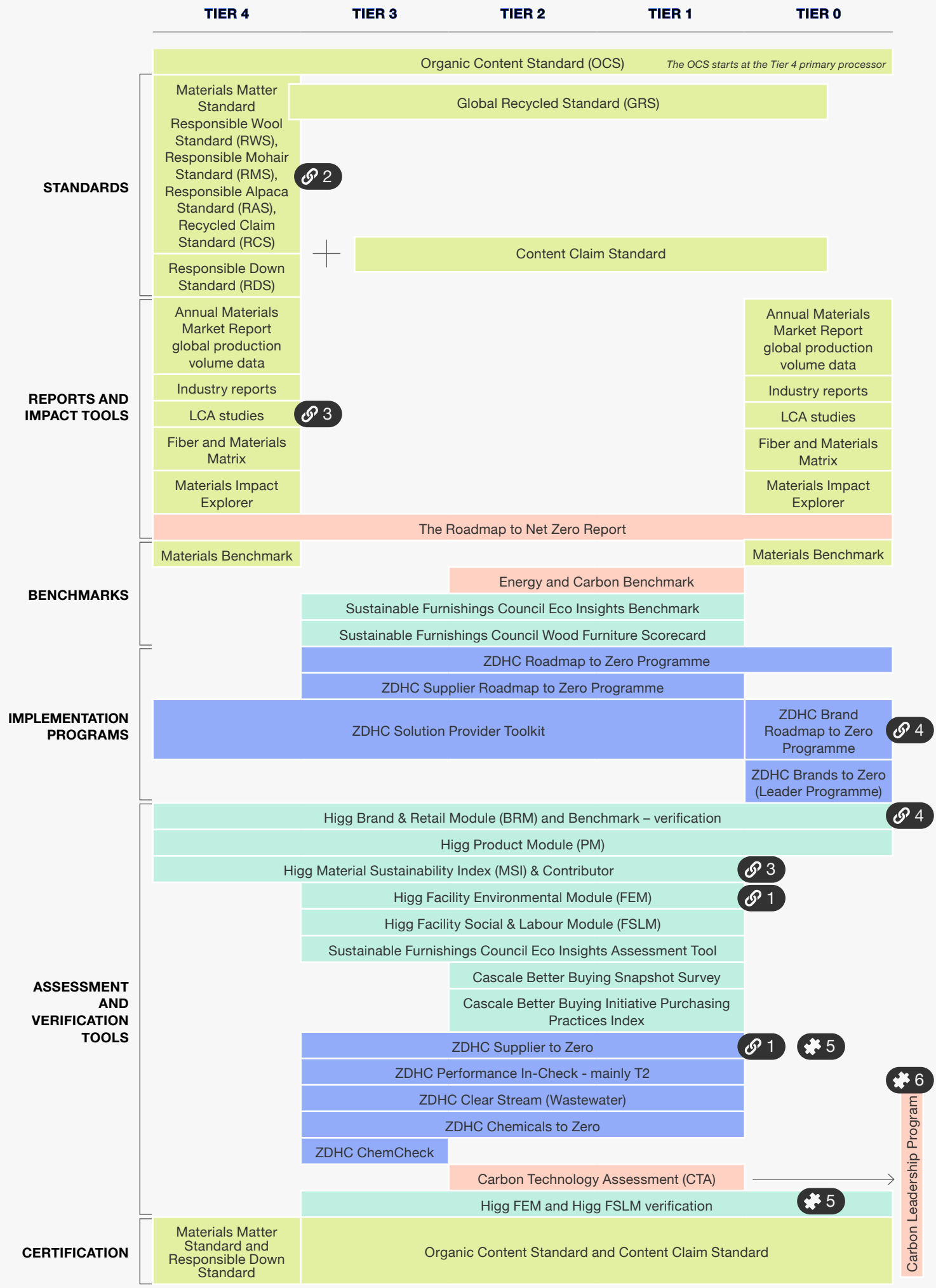
Connectivity:
Describes when an organization's tool, program, guideline, standard or initiative refers to, or draws information from, a component of another tool, program, standard or initiative.

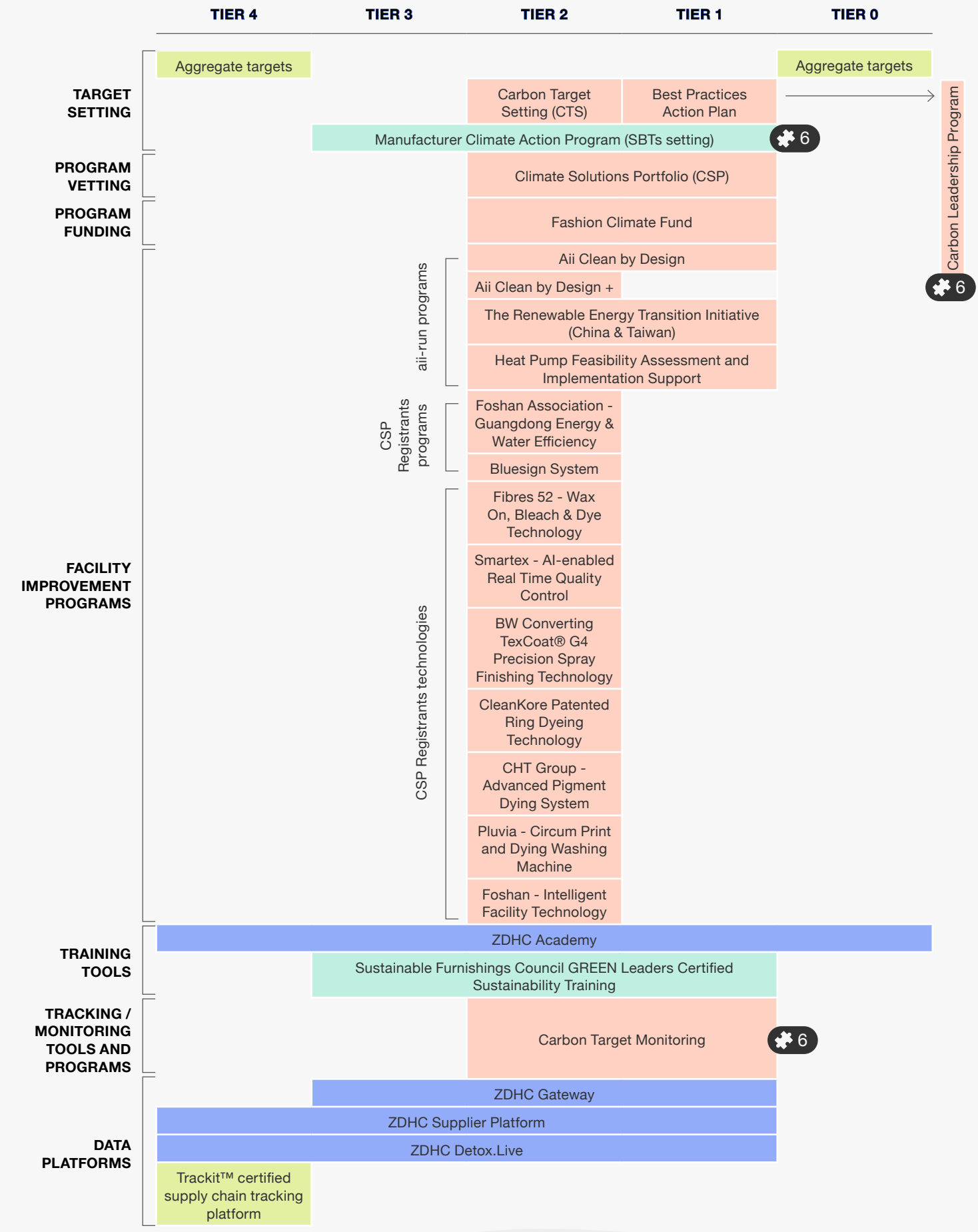
1. The ZDHC MRSL guidelines and the Sustainable Chemical Management Framework are implemented and verified through ZDHC's Supplier to Zero. Similarly, ZDHC reporting tools form the basis for chemical management data collection and measurement in Cascale's Higg FEM. The Higg FEM questionnaire asks about conformance with ZDHC MRSL, Wastewater and Sludge Guidelines, and Air Emissions Guidelines.
2. ZDHC developed chemical management guidelines for man-made cellulosic fibre (MMCF), and recycled polyester (rPET) that are incorporated and recognized in Textile Exchange's Materials Matter Standard. The Materials Matter Standard recognizes valid ZDHC certificates as proof of implementing chemical management practices required to obtain the wider Materials Matter Standard certification. The two organizations continue to work together on upcoming dissolving grade pulp (textile-to-textile) and recycled polyamide (rPA) guidelines.
3. Textile Exchange's cotton and polyester Life Cycle Assessment (LCA) studies serve as key data sources for Cascale's Higg MSI modeling. Cascale also participated in Textile Exchange's critical review panels for both LCA studies, contributing to the independent validation of their methodological robustness and credibility.
4. Brands completing the ZDHC Brands to Zero Leader Programme can use their results to address questions on sustainable chemical and wastewater management within Cascale's Higg Brand and Retail Module (BRM), thereby reducing duplication in assessments.

Complementarity:
Describes an overlap that has been identified between tools, programs or initiatives, where an opportunity for connectivity exists and the apparel alliance is addressing it at various levels of maturity.

5. In 2024, Cascale and ZDHC announced a three-year strategic collaboration aimed at reducing duplication between the ZDHC Supplier to Zero and Cascale Higg FEM assessment frameworks, progressing towards combined verification and ultimately establishing mutual recognition, alongside joint initiatives on training and education.
6. Apparel Impact Institute (Aii) programs can be leveraged by participants of the Cascale Manufacturer Climate Action Program (MCAP) in identifying sustainable finance options and models available to manufacturers for access to capital. MCAP manufacturers can reach out to Aii after the intro to sustainable finance training, have a conversation with aii, learn about available programs, grants, and other opportunities that can help them to get started on decarbonization plan implementation on facility level improvements.




TIER 4
TIER 3
TIER 2
TIER 1
TIER 0
STANDARDS
Organic Content Standard (OCS)
The OCS starts at the Tier 4 primary processor
Materials Matter Standard
Responsible Wool Standard (RWS), Responsible Mohair Standard (RMS), Responsible Alpaca Standard (RAS), Recycled Claim Standard (RCS)
Global Recycled Standard (GRS)
2
Content Claim Standard
Responsible Down Standard (RDS)
REPORTS AND IMPACT TOOLS
Annual Materials Market Report global production volume data
Industry reports
LCA studies
3
Fiber and Materials Matrix
Materials Impact Explorer
The Roadmap to Net Zero Report
BENCHMARKS
Materials Benchmark
Energy and Carbon Benchmark
Sustainable Furnishings Council Eco Insights Benchmark
Sustainable Furnishings Council Wood Furniture Scorecard
IMPLEMENTATION PROGRAMS
ZDHC Roadmap to Zero Programme
ZDHC Supplier Roadmap to Zero Programme
ZDHC Solution Provider Toolkit
ZDHC Brand Roadmap to Zero Programme
4
ZDHC Brands to Zero (Leader Programme)
ASSESSMENT AND VERIFICATION TOOLS
Higg Brand & Retail Module (BRM) and Benchmark – verification
4
Higg Product Module (PM)
Higg Material Sustainability Index (MSI) & Contributor
3
Higg Facility Environmental Module (FEM)
1
Higg Facility Social & Labour Module (FSLM)
Sustainable Furnishings Council Eco Insights Assessment Tool
Cascale Better Buying Snapshot Survey
Cascale Better Buying Initiative Purchasing Practices Index
ZDHC Supplier to Zero
1
5
ZDHC Performance In-Check - mainly T2
ZDHC Clear Stream (Wastewater)
ZDHC Chemicals to Zero
ZDHC ChemCheck
6
Carbon Leadership Program
Carbon Technology Assessment (CTA)
Higg FEM and Higg FSLM verification
5
CERTIFICATION
Materials Matter Standard and Responsible Down Standard
Organic Content Standard and Content Claim Standard


TIER 4
TIER 3
TIER 2
TIER 1
TIER 0
TARGET SETTING
PROGRAM VETTING
PROGRAM FUNDING
FACILITY IMPROVEMENT PROGRAMS
TRAINING TOOLS
TRACKING / MONITORING TOOLS AND PROGRAMS
DATA PLATFORMS
Aggregate targets
Aggregate targets
Carbon Target Setting (CTS)
Best Practices Action Plan
Carbon Leadership Program
Manufacturer Climate Action Program (SBTs setting)
6
Climate Solutions Portfolio (CSP)
Fashion Climate Fund
aii-run programs
Aii Clean by Design
Aii Clean by Design +
6
The Renewable Energy Transition Initiative (China & Taiwan)
Heat Pump Feasibility Assessment and Implementation Support
CSP Registrants programs
Foshan Association - Guangdong Energy & Water Efficiency
Bluesign System
CSP Registrants technologies
Fibres 52 - Wax On, Bleach & Dye Technology
Smartex - AI-enabled Real Time Quality Control
BW Converting TexCoat® G4 Precision Spray Finishing Technology
CleanKore Patented Ring Dyeing Technology
CHT Group - Advanced Pigment Dying System
Pluvia - Circum Print and Dying Washing Machine
Foshan - Intelligent Facility Technology
ZDHC Academy
Sustainable Furnishings Council GREEN Leaders Certified Sustainability Training
Carbon Target Monitoring
6
ZDHC Gateway
ZDHC Supplier Platform
ZDHC Detox.Live
Trackit™ certified supply chain tracking platform

APPENDIX 2: RESEARCH METHODOLOGY

This report was developed by Zuzana Mocilenkova with input and information provided by the apparel alliance.

The research for this report was undertaken between February and August 2026 and included:

- Mapping of the relevant tools and programs for each apparel alliance organization;
- Analysis of existing complementarities, overlaps and opportunities;
- Desk research of relevant literature; and
- Interviews with brands and supplier who are members of apparel alliance network.

MAPPING AND DESK RESEARCH

Relevant tools, programs and initiatives of Apparel Impact Institute (Aii), Cascale, Textile Exchange and ZDHC were reviewed and mapped across the TCLF supply chain tiers. The analysis considered their purpose, intended users, supply chain coverage and areas of complementarity, existing overlaps and future opportunities. Relevant apparel alliance internal documentation and selected external industry research were also reviewed to provide context and supporting evidence.

The resulting Connected Supply Chain Map is provided in Appendix 1.

INTERVIEWS

The research included 12 interviews and 24 participants, representing apparel alliance organizations, brands and suppliers/manufacturers. Semi-structured interviews explored experiences of using the relevant tools and programs, experience of alignment and duplication, practical benefits and challenges, and opportunities for further improvement.

APPAREL ALLIANCE	NUMBER OF PARTICIPANTS
Interview 1	**4**
Interview 2	**1**
Interview 3	**1**
Interview 4	**2**
Interview 5	**3**

BRANDS	NUMBER OF PARTICIPANTS
Interview 6	**3**
Interview 7	**1**
Interview 8	**4**
Interview 9	**2**
SUPPLIERS	**NUMBER OF PARTICIPANTS**
Interview 10	**1**
Interview 11	**1**
Interview 12	**1**

Findings from the interviews were analyzed alongside the mapping and desk research to identify recurring themes, examples, case studies and opportunities. Stakeholder perspectives have been synthesized and are not attributed to individual participants.

SCOPE AND LIMITATIONS

The research was designed as a high-level qualitative review rather than a comprehensive technical assessment of complementarities and overlaps between the tools and programs. The findings reflect the experiences of a targeted group of stakeholders and should not be interpreted as statistically representative of the wider industry.

While the research covered suppliers from different parts of the textile and clothing sector, suppliers of the footwear and leather sector were underrepresented in the stakeholder interviews. Many of the challenges identified are likely to be relevant across these sectors, but this was not directly tested through the research.

The mapping and report provides a point-in-time overview of a landscape that continues to evolve.

apparel alliance

Front cover image: Luisa Bravo