BCE ALLIANCE

PART 2

PREVENTION BY DESIGN

People, Process & Technology

Austin, Texas | 9 senior participants | Cross-supply-chain discussion

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THE PRINCIPLE

We don’t believe sustainable digital infrastructure is created by better products alone. We believe it is created through better collaboration

A Note on This Edition

This is the full edition of the Austin roundtable report, built in the same BCE Alliance template as the London report. It carries the complete content of the original Austin write-up, including the material that was trimmed from the shorter, publication-ready edition: the full set of Key Conclusions, the Proposed Collaboration Model and governance structure, the Priority Questions to Carry Forward, the Suggested Outputs for the Next Session, the Advanced Strategic Analysis, and the Appendix of Discussion Themes. It is intended as the complete reference version for internal use.

Executive Summary

The Austin conversation reinforced a structural challenge: data centre delivery is accelerating faster than many traditional design, procurement and handoff models can adapt. Rapid capacity growth, workforce constraints, high density compute, liquid cooling and compressed schedules are increasing the consequence of decisions made too late, or without the right stakeholders in the room.

Risk is rarely created by one discipline in isolation. It emerges at the interfaces: between design and procurement, specialist systems and base build infrastructure, construction and operations, commercial decisions and technical outcomes. Prevention by Design therefore requires earlier cross-functional decisions, explicit ownership and reliable routes for technical challenge.

The practical implication is significant. Decisions around monitoring, leak detection, heat tracing, fluid management, access, controls integration, commissioning, maintenance and warranty boundaries can influence availability, safety, programme, energy performance and whole-life resilience.

Austin moved the programme from diagnosis toward action. Participants called for technical input into procurement, clearer design ownership, structured lessons learned, operations readiness reviews, stronger participation in existing technical forums, and focused tiger teams able to convert recurring industry problems into practical, testable guidance.

Taken together with the London roundtable, the next phase should be global and implementation-led: establish a common Prevention by Design charter, then mobilise a cross-functional Data Centre Global Tiger Team to develop, pilot and publish a small set of repeatable tools that can be adopted across projects and regions.

1. The Roundtable Question

The discussion was framed around one central question: how must people, process and technology work differently to create resilient, responsible and future-ready digital infrastructure?

Participants approached this through three lenses. The people lens focused on workforce capability, stakeholder involvement, accountability and psychological safety. The process lens focused on design intent, procurement, delegated design, handoffs and lifecycle ownership. The technology lens focused on liquid cooling, monitoring, AI, automation, standards and maintainability.

2. Industry Evidence Alignment

The Austin findings are strongly aligned with current data centre market evidence. The sources listed at the end of this report connect the roundtable themes to external data centre news, research and standards activity. The aim is not to replace the voice of the room, but to show that the issues raised by participants are consistent with wider market signals.

This evidence changes the weight of the report. Austin should be positioned not as an isolated industry conversation, but as a practical response to the direction of the market. The same pressures are visible in public policy, power planning, workforce forecasting, cooling standards and sustainability reporting.

3. Key Conclusions

1. The workforce challenge is now a design risk, because inexperienced teams are being asked to deliver increasingly complex facilities under extreme schedule pressure.

2. Delegated design can work for small systems, but it becomes a major risk at data centre scale, when specialty systems require power capacity, controls integration, alarm strategy, commissioning planning and operational response.

3. Procurement models are often optimised for price comparison rather than technical outcome, which can prevent qualified alternatives from being considered early enough.

4. Liquid cooling and AI infrastructure are advancing faster than operational readiness, maintenance procedures and stakeholder communication pathways.

5. Lifecycle management must be included at design stage, not added after deployment, because monitoring, maintenance, refresh, repairability and retirement all influence long-term resilience.

6. Industry forums such as OCP and focused roundtables can help close the standards gap, but participation and information transfer need to become more deliberate.

7. The next phase of Prevention by Design should turn discussion into working mechanisms: checklists, handoff protocols, procurement language, tiger teams and repeatable education.

8. Current industry evidence supports the roundtable findings and shows that the pressures raised in Austin are already visible across power markets, workforce planning, cooling standards, public policy and sustainability reporting.

4. What We Heard in Austin

Growth Is Exposing the Workforce and Education Gap

Participants repeatedly linked rapid industry growth with a shortage of qualified people. The discussion referenced severe labour pressure across manufacturing, contracting, field installation and commissioning. One estimate raised in the room was that the industry could face a shortage of 500,000 people by 2030.

The practical concern was not only headcount, it was capability. Participants described newer contractors entering complex data centre environments with limited mission critical experience, while experienced professionals are immediately recruited elsewhere. This creates a direct quality and resilience issue, because complex project decisions are being made and executed by teams that may not yet understand the full operational consequence.

Incomplete Design Creates Downstream Risk

Incomplete design and unclear scope were identified as recurring sources of avoidable risk. Participants noted that specialty systems such as electric heat tracing, leak detection and other monitoring systems are often poorly understood at the engineering level, then pushed downstream into delegated design or field resolution.

At data centre scale, this is not a minor coordination issue. A system that may involve only a few circuits in a conventional building can become hundreds of circuits, significant electrical load, BMS integration, zoning strategy, alarm response and commissioning scope in a data centre environment. If these requirements are not allowed for upstream, downstream teams inherit schedule pressure, cost pressure and operational ambiguity.

The Austin discussion showed that Prevention by Design must include earlier specialty input during basis of design, coordinated design and procurement preparation. This is especially important where the final system supports uptime, freeze protection, water risk management, safe access, liquid cooling readiness or operational response.

Procurement Is Not Yet Built for Technical Innovation

The procurement conversation was one of the strongest themes. Participants described how traditional RFP and bid levelling processes can discourage bidders from challenging specifications, even when a requirement appears technically inappropriate. The Phoenix roof and gutter de-icing example illustrated how unnecessary scope can be carried forward because bidders fear being marked non-compliant.

The group identified a gap between financial decision-making and technical evaluation. Procurement teams are often asked to compare written specifications and cost returns without direct access to the engineering expertise needed to evaluate whether an alternative would reduce risk or improve long-term value.

A practical recommendation was to build technical consultation into procurement, and to include clearer language in RFPs that invites add alternates, qualified alternatives and technical challenge where the bidder can demonstrate a better outcome.

Liquid Cooling Requires Operational Readiness Before Deployment

Liquid cooling was discussed as a major example of technology arriving faster than operational readiness. Participants described cases where equipment and thermal solutions reached receiving docks before operations teams had clear procedures for testing, maintenance, fluid response, remediation or escalation.

The risk is not that liquid cooling technology is unavailable. The risk is that the supporting operating model is incomplete. Facilities teams need early visibility of primary and secondary loops, CDU strategy, fluid requirements, leak detection, warranty responsibilities, maintenance operating procedures and standard operating procedures.

The conversation also referenced industry movement toward standardising fluids, CDUs and warranty responsibility across OEMs. This standardisation effort is positive, but it needs to be accompanied by early education and operational integration, so facilities teams are not left to interpret complex new systems after installation.

Lifecycle Management Must Start at Design Stage

The discussion expanded sustainability beyond energy performance. Participants connected responsible infrastructure to maintainability, monitoring, repairability, community impact, decommissioning, refresh cycles and responsible equipment recovery.

The design, procure, install, manage lens was useful because it exposed a common weakness: management is often not designed with the same seriousness as procurement or installation. Data centre infrastructure may need to operate and adapt for 10 to 12 years or more after capital investment, but many project plans do not fully cover steady state management, retirement, repair, replacement or refresh.

Prevention by Design therefore requires whole-life thinking from inception. That includes monitoring strategy, access, disassembly, spare capacity, recovery planning, operational data, warranty boundaries and practical maintainability.

Standards and Information Channels Are Underused

Participants highlighted that useful forward-looking information already exists through OCP, hyperscaler working groups, OEM forums and technology conferences. However, awareness and participation remain uneven, including among senior professionals who influence delivery models and specifications.

The Austin roundtable positioned OCP as one of the closest available forums for data centre standardisation, particularly as AI and high-density infrastructure drive new requirements. At the same time, participants acknowledged that formal standards development can be slow. For immediate issues, cross-functional tiger teams under multi-party NDA may provide a faster route to test language, requirements and decision frameworks.

Breaking Silos Requires Mechanisms

The group recognised that silos exist partly because the industry has been designed for speed. The challenge is to increase cross-functional visibility without stopping delivery. Several participants emphasised the need to look upstream and downstream in the workflow, inviting the people on either side of a decision into the conversation before risk becomes embedded.

The Toyota Andon cord concept was raised as a useful principle: any person should be able to stop and escalate when they see a material issue. For data centres, the equivalent is not simply pausing construction. It is creating safe escalation routes, shared accountability and leadership support for raising concerns before they become defects, incidents or expensive rework.

5. Risk Patterns and Prevention Responses

The table below links the patterns participants kept describing to a practical prevention response for each one.

Risk pattern	What it creates	Prevention by design response
Late specialty system input	Missing power, controls, alarm strategy, commissioning scope and operational ownership.	Bring heat tracing, leak detection, monitoring and access requirements into Stage 3 and basis of design reviews.
Low-bid procurement and rigid bid levelling	Under-qualified selection, missed innovation and unnecessary scope carried forward.	Embed technical review in procurement and invite qualified alternatives and add alternates in RFP language.
Technology deployed before operations are ready	Reactive response, unclear MOPs and SOPs, maintenance ambiguity and warranty disputes.	Create early operations readiness reviews for liquid cooling, AI infrastructure and high-density deployments.
Lessons learned stay on job sites	Recurring errors across BMS, EPMS, monitoring and specialty packages.	Formalise lessons-learned capture and update bid forms, checklists and standard scopes after each project.
Lifecycle management left until after handover	Poor maintainability, weak refresh planning and avoidable end-of-life cost.	Apply design, procure, install, manage thinking from inception, including monitoring, repairability and retirement.
Silos between design, procurement, construction and operations	Poor handoffs, duplicated effort and hidden accountability gaps.	Use cross-functional reviews and tiger teams with clear charters, authority and escalation routes.

6. Recommended Action Framework

The following framework turns the roundtable themes into practical next steps. It is designed to be simple enough to test quickly while still addressing the main risk points raised in Austin.

Proposed Collaboration Model

A recurring message was that industry collaboration cannot rely only on large conferences or one-off panels. The value of the Prevention by Design platform is that it creates a candid environment where operators, contractors, engineers, specialist manufacturers, procurement leaders and lifecycle partners can compare where risk is being created and where it can be prevented.

A practical collaboration model could include three connected formats:

- Roundtables, to surface cross-industry patterns and identify shared risk themes.
- Tiger teams, to convert selected themes into templates, checklists, proposed language and pilotable guidance.
- Education sessions, to move the learning back into consultant, contractor, operator and procurement communities.

This structure keeps the discussion strategic while still producing practical outputs. It also allows participants to engage at the right level: senior leaders can align on direction, technical specialists can refine the detail, and field teams can test whether the guidance works in real delivery conditions.

7. Priority Questions to Carry Forward

Several issues were clearly identified but require further ownership, structure and testing. These questions should shape the next stage of the Prevention by Design programme.

1. What formal mechanism should give operations teams early visibility of emerging technologies before equipment is procured or deployed.

2. How should lifecycle management, monitoring and end-of-life planning be written into early design specifications and procurement requirements.

3. How can procurement evaluate technical quality and innovation without compromising commercial fairness.

4. What training or certification pathway is needed for data centre construction teams entering mission critical environments.

5. How should downstream design changes be communicated so that all affected stakeholders remain aligned.

6. How can technical experts reach financial decision-makers before cost-led decisions create long-term risk.

7. How should fragmented AI and automation tools be integrated into a coherent operational model.

8. What safe escalation route allows individuals to challenge a specification or stop a process when they identify material risk.

8. Suggested Outputs for the Next Session

Output	Purpose	Possible owner group
Prevention by design checklist	Capture the minimum upstream questions for design, procurement, installation and operation.	BCE Alliance with selected operators, consultants, GCs and specialist manufacturers.
RFP alternative language	Give bidders a safe route to propose technically justified alternatives and add alternates.	Procurement, engineering and commercial representatives.
Liquid cooling readiness guide	Define information needed by operations before deployment, including fluids, CDUs, leak detection, MOPs and SOPs.	Operators, OEMs, fluid providers, commissioning specialists and monitoring specialists.
Lessons learned capture method	Move field solutions into future bid documents, specifications and internal standards.	GCs, specialist contractors, commissioning teams and owner representatives.
OCP participation pathway	Increase awareness of existing working groups and forward-looking technical forums.	Industry associations, hyperscaler representatives and technical contributors.

9. Proposed Collaboration Model: Governance

Alongside the three formats in section 6, the following structure was proposed to keep a cross-functional collaboration model accountable and moving at pace.

Element	Proposed model	Purpose
Sponsor / convener	BCE Alliance.	Protect neutrality, convene the right stakeholders and maintain momentum.
Executive sponsors	Two to three owner or operator senior industry leaders.	Provide authority, access and a route into organisational standards.
Core team	12 to 16 cross-functional global members.	Keep the group small enough to act and broad enough to test consequences across the lifecycle.
Workstream leads	One lead per selected priority.	Own deliverables, evidence gathering, pilots and deadlines.
Cadence	Bi-weekly 60 minute working sessions, monthly sponsor review.	Maintain speed without creating another conference-style forum.
Decision rule	Evidence, cross-functional review and pilot feedback together.	Prevent single-vendor or single-discipline guidance.
90-day outputs	Two tested tools, implementation recommendations and a next-priority backlog.	Create visible proof that the model can turn dialogue into change.
Route to scale	Owner standards, consultant specifications, RFPs, contractor processes, OCP and industry forums.	Move validated learning into the places where project decisions are actually made.

10. Advanced Strategic Analysis

The Austin evidence points to an interface-risk problem: decision authority, technical knowledge and lifecycle accountability frequently sit in different organisations. The programme should therefore measure not just technical compliance, but whether critical decisions were made with the right evidence and stakeholders before commercial lock-in.

Evidence Hierarchy and Methodological Limitations

This report distinguishes three evidence types. Type A is themes reported in facilitated roundtable discussion. Type B is independent market research and standards documents cited in the original report. Type C is BCE Alliance proposals requiring validation. Roundtable comments are qualitative and should not be represented as a representative survey or causal proof. Neither project-level loss data nor participant-level attribution was supplied, so the quantified benefits referenced elsewhere in this report are measurement proposals, not demonstrated outcomes.

Systems Risk Propagation Model

A typical failure pathway runs as follows: incomplete design assumptions lead to ambiguous specialist scope, which leads to low-price substitution or delegated design, which leads to missing power, controls or access provisions, which leads to commissioning delay, which leads to reduced operational visibility or maintainability. At each transition, the recommendation is to record the decision owner, technical reviewer, residual risk, cost exposure and operational acceptance. This creates an auditable chain of accountability without assuming every project follows the same sequence.

Prevention Maturity Model

- Level 1, Reactive: issues resolved after procurement or installation.
- Level 2, Documented: design-risk reviews exist but are discipline-specific.
- Level 3, Integrated: operators, procurement and specialist suppliers join formal design gateways.
- Level 4, Measured: change, defect and operational-readiness metrics feed design standards.
- Level 5, Adaptive: cross-project evidence continuously updates specifications and procurement criteria.

The scale is a proposed BCE diagnostic, not an accredited industry standard.

Commercial Decision Framework

For each proposed intervention, the recommendation is to compare upfront capital cost with expected whole-life exposure: redesign and rework, schedule delay, commissioning failure, service disruption, maintenance access, energy and water consumption, and asset replacement. Scenario ranges should be used rather than unsupported single-point savings. Procurement evaluation should require a documented technical-equivalence assessment and a transparent mechanism for qualified alternatives.

11. Towards a Globally Aligned Prevention by Design Framework

The London and Austin discussions point to an industry-wide opportunity: establish a common approach to design assurance that works across regions, disciplines and project stages. This should complement, not replace, existing codes, regulations and technical standards, while allowing owners to specify higher resilience requirements.

Five Recommendations for the Global Data Centre Community

1. Establish common design-assurance checkpoints from concept through handover, with explicit accountability for unresolved risks and assumptions.

2. Standardise a minimum interdisciplinary information set covering design intent, critical interfaces, changes, commissioning evidence and operational requirements.

3. Require coordinated technical reviews before key procurement and design-freeze decisions, including specialist suppliers and operational representatives where relevant.

4. Strengthen procurement and substitution controls so cost, resilience, maintainability, energy and whole-life implications are evaluated together.

5. Build a shared learning loop: anonymised commissioning findings, incidents and maintenance experience should inform future specifications and assurance processes.

AN INVITATION TO COLLABORATE

BCE Alliance is exploring a Global Data Centre Tiger Team: a cross-disciplinary forum for industry stakeholders interested in developing practical, internationally relevant approaches to preventing avoidable failures. The initiative is at an exploratory stage. Owner-operators, consultants, contractors, specialist manufacturers and other stakeholders interested in contributing are invited to contact BCE Alliance through its website.

12. The Developing BCE Framework

Austin reinforced the same seven-step framework first set out after London, rather than replacing it. Over time, BCE aims to consolidate each roundtable's findings into one practical mission critical collaboration framework.

STEP	PRINCIPLE	INTENT
01	ALIGN	Create shared outcomes and assumptions at concept stage.
02	DESIGN	Build resilience, maintainability and prevention into the basis of design.
03	ENGAGE	Bring relevant supply-chain and specialist expertise in before decisions become expensive to change.
04	DELIVER	Protect design intent through procurement, construction and commissioning.
05	OPERATE	Use operational feedback to improve current assets and future projects.
06	REUSE	Plan adaptation, second life and end-of-life as part of the lifecycle, not as an afterthought.
07	CONTRIBUTE	Measure success not only by infrastructure performance, but by responsible resource use and wider societal value.

13. Conclusion

Prevention by Design Part 2 confirmed that the data centre sector is not short of expertise. It is short of reliable mechanisms for getting that expertise into decisions early enough. London surfaced the need for earlier prevention. Austin expanded the evidence across people, process and technology and identified practical mechanisms for action.

The next phase should therefore be judged not by the number of conversations held, but by the number of recurring risks converted into usable, tested industry mechanisms. A Global Prevention by Design Charter followed by a 90-day Data Centre Global Tiger Team pilot creates that bridge: from insight, to ownership, to implementation, to scale.

If successful, the model can become a repeatable global change engine: identify a systemic risk, convene the stakeholders who own its consequences, test a practical intervention, and feed the validated learning back into design standards, procurement, delivery and operations. That is how Prevention by Design moves from an industry conversation to measurable impact.

Appendix: Discussion Themes

The following themes were reflected across the Austin discussion and should be retained as source context for future reporting and programme planning.

- Industry growth and workforce shortages are placing pressure on manufacturing, contracting, installation and commissioning capacity.
- Incomplete design and unclear delegated design boundaries are creating downstream issues for specialty systems and infrastructure support.
- Liquid cooling adoption is exposing gaps in operational readiness, procedures, maintenance planning and warranty responsibility.
- Lifecycle planning needs to cover post-implementation management, monitoring, refresh, repairability and retirement.
- Procurement processes need better technical input to avoid lowest-price decisions that create long-term quality and resilience issues.
- Organisational silos are preventing upstream and downstream stakeholders from seeing the consequence of each other's decisions.
- OCP and other technical forums provide valuable future-looking information, but participation and awareness need to increase.
- Tiger teams, trusted advisor circles and candid collaboration platforms could help address urgent standards and communication gaps.
- AI and automation may help with labour pressure and operational complexity, but fragmented tools need integration and governance.
- Psychological safety and practical escalation routes are needed so field teams and younger professionals can raise concerns before failure occurs.

Selected External Sources

These sources were used to align the Austin findings with wider data centre market evidence.

International Energy Agency. AI is set to drive surging electricity demand from data centres while offering the potential to transform how the energy sector works. 10 April 2025.

CBRE. Global Data Center Trends 2025. 24 June 2025.

Uptime Institute. Global Data Center Survey 2024, Vendor Results. 2024.

Open Compute Project. Modular Technology Cooling System for Cloud Scale Data Center Rack Deployment. 2025.

UK Government, Department for Science, Innovation and Technology. Data centres to be given massive boost and protections from cyber criminals and IT blackouts. 12 September 2024.

United Nations University Institute for Water, Environment and Health. Environmental Cost of AI's Energy Use. 2026.

Zage Business of Energy Initiative, University of Southern California. Data Center Employment Forecast Analysis. November 2025.