Commissioning Risk and the DSU Gap in Data Centre Construction

Why the most expensive project risks often appear after construction is "complete"

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Executive summary

Data centre construction has grown quickly in both scale and complexity. US construction spending increased from about US$1.8 billion in 2014 to US$28.3 billion in 2024 [1]. Individual projects now combine multi-billion-dollar capital programmes, compressed schedules, long-lead equipment, and firm commitments to customers who expect capacity on a specific date. As the AI race continues, this pace will only continue to grow.

The most serious exposure often appears late in the project as systems are being started for the first time. Delay-in-start-up (DSU) insurance covers lost income when insured physical damage delays completion. In a data centre, the revenue loss from delays due to delayed integration, equipment failure, or control system confusion, can greatly exceed the cost of physical damage during installation [2].

However, the phase that drives the greatest exposure to risk of delay - testing, energization, integration, commissioning, operational readiness, and transfer of operational control – which is also the phase where schedules are tightest and evidence is often the least consistent – is also the phase with the least project controls and governance, often left to chance and random outcomes.

This article argues that the gap between the end of construction and first day of commercial operation is managerial, not simply technical or financial. The complete ICxA Outcome Governance framework provides a specific model for closing this gap: Outcome Assurance governs who can authorize progression and accept residual risk through the entire project lifecycle; Commissioning & Outcome Execution defines the technical gates and evidence to support system readiness decisions; and Operational Readiness tests whether the receiving organization can safely and reliably take control of the new facilities [8]. For underwriters and lenders, the primary value of the ICxA Outcome Governance Standards is earlier visibility and intervention - when deficiencies, capability gaps, and transition risks can still be corrected before they cause delay. The framework also provides a more reliable basis for pricing, conditions, due diligence, drawdown, and completion decisions to protect project capital.

The risk rises as the project nears operation

The AI race is driving hyperscale campuses to be delivered on compressed schedules, with contract values measured in billions of dollars, long-lead electrical equipment, and revenue commitments that begin when capacity is placed into commercial operation.

The insurance market has responded with large broker-led facilities and builders risk products that extend into phased handover and early operations [3, 4]. These are important innovations. But insurance capacity does not, by itself, make a project ready or make the transition risk visible – this can only come from the systems and processes used within the project execution lifecycle to govern outcomes.

The risk profile changes sharply after construction is complete and equipment is integrated and energized - systems must begin to operate together for the first time. Construction may be substantially complete, yet the project is entering its least forgiving period: testing, commissioning, integrated operation, handover, and transfer of control to the operating organization. The project meets the real world at this point.

The DSU gap

DSU insurance covers lost income when insured physical damage delays completion of installation. The cost of damaged equipment is often only a small part of the total project loss. If long lead equipment is damaged during startup and takes months to replace, or if there are delays integrating systems, the interruption due to delay can dwarf any repair bill to replace damaged equipment during installation [2]. The consequences of delays during integration and startup can become the dominant source of project overruns.

Underwriters respond to what they cannot see by limiting participation where there is too much risk, applying sublimits, increasing attachment points, or requiring detailed commissioning and phased-handover plans [2]. Instead of limiting participation, a governed readiness model gives underwriters something more useful than a schedule declaration – it gives them defined readiness gates, minimum evidence requirements, independent review of this complex phase, and an explicit record of residual risk – it gives them a framework to baseline against, rather than limiting participation.

A DSU claim depends on evidence. The project must connect physical damage to schedule delay, separate that delay from existing problems, and show what the facility would have achieved without the loss. System boundaries, test results, deficiencies, readiness decisions, training, procedures, maintenance plans, spares, and handover records can become decisive rather than subjective [5, 6]. Not only for physical damage during installation causing delay, but also during integration and startup to quantify all aspects of delay.

This is the DSU gap – the ungoverned phase of projects between installation complete and operational systems. Policies assume a level of project control and evidence that many delivery models are not consistently producing. The central question that must be answered is whether the project can show that the asset and the operating organization were genuinely ready – to answer the question, “Is this project achieving the objectives it was initially funded to achieve”.

Where the exposure concentrates

The recurring loss drivers are familiar and recurring. What makes them difficult is that they are only revealed late in the project, many years after project initiation, when time is short and commercial pressure is highest:

- Phased handover. One data hall may be operating while construction continues nearby. Ownership, access, permits, isolation, and insurance responsibilities can become unclear across the same campus [1, 4].
- Testing and first use. High-value equipment is exposed to its first electrical, mechanical, and control-system interactions. Problems not identified during installation become visible during integration and first operation [1, 2].
- Fire and environmental control. Hot work, active construction, and incomplete cooling or humidity control can create severe losses once data halls contain sensitive equipment [4], when systems cannot be depended upon for reliable operation.
- Schedule compression. When earlier work runs late, commissioning and operational preparation are often shortened to protect the promised service date. This removes time intended to find and correct defects, impacting reliability of routine operations.
- Weak records and unclear boundaries. If the project cannot show which system was complete, who controlled it, which deficiencies remained, and who accepted the risk, both loss prevention and claim resolution become harder.
- Incomplete operating capability. A technically functioning facility can still be unsafe or unreliable if people are not trained, procedures are not validated, maintenance and spares are not ready, or decision rights are unclear.

These are not unusual engineering problems. They are failures of governance, evidence, and decision-making that allow technical problems to become larger commercial losses.

What projects should do differently

The answer is not another layer of paperwork. It is a clearer governance model for the transition from construction to operation. Five practices must be in place to govern outcomes.

The objective is simple: important transitions should occur because defined conditions have been met, not merely because the schedule has reached a milestone date.

1. Structure systems and evidence before risk is locked in

ICXA-20101 requires the project to define system boundaries and organize commissioning information so evidence can be traced to the equipment, system, test, deficiency, and decision it supports [8]. This lets insurer risk engineers engage before procurement and energization risks are fixed, and gives lenders' independent engineers a consistent basis for reviewing progress against the financed scope. The ability to identify and address integration and startup risk earlier gives funding organizations insight into capital risk.

2. Use linked commissioning and operational-readiness gates

ICXA-20101 separates Construction Completion, readiness for dynamic commissioning, readiness for start-up, performance verification, trial operation, and System Handover. ICXA-20201 adds organizational gates, including Organizational Readiness Complete, Asset Operational Control Ready, Initial Operational Capability, and Full Operational Capability [8]. Transfer of Operational Control should follow a documented readiness decision; it should not be implied or assumed by energization, physical turnover, or the project schedule. Residual risk is documented rather than assumed.

3. Separate readiness recommendations from outcome authorization

The teams executing and reviewing the work produce evidence and readiness recommendations. Outcome authorization and acceptance of residual risk must remain a separate governance decision under the ICXA-10000 series [8] to avoid conflict of interest. This separation matters when delivery pressure is high: it gives underwriters, lenders, and boards visibility of who reviewed the evidence, who gave authority to proceed, and which conditions remained open, ultimately giving full risk transparency to everyone involved.

4. Prove day one operation

ICXA-20201 tests four connected core capabilities: People, Organization, Asset, and Systems & Processes [8]. Staffing and competence are reviewed alongside procedures, emergency response, maintenance, spares, asset data, digital systems, vendor support, and control of work. The result is a Readiness Evidence Dossier and controlled decision record, not a collection of late checklists.

5. Use evidence early enough to prevent delay

The required evidence should be available while there is still time to act. System status, test results, open deficiencies, readiness conditions, authorization records, residual risk, handover, and transfer-of-control records allow project teams, insurers, and lenders to identify incomplete systems, unresolved dependencies, and operating-capability gaps before energization, start-up, or transfer to operations. The same evidence supports lender drawdowns, completion tests, and underwriting conditions; if a loss later occurs, it can also support a DSU claim.

ICxA Standards define the missing governance model

The ICxA Standards replace vague phrases such as 'commissioning complete' or 'ready for operation' with defined conditions, evidence, decision authority, and residual-risk records that all parties can view and understand.

The complete ICxA Outcome Governance framework brings the three standards together as one management system. Outcome Assurance under ICXA-10001 is the Level 1 governance layer: it defines the intended outcome, evidence requirements at lifecycle gates, authority to accept residual risk, and Outcome Authorization. ICXA-20101 governs Commissioning & Outcome Execution as a Level 2 discipline, including system structure, technical readiness gates, testing, safety, handover, and traceable evidence. ICXA-20201 governs Operational Readiness as the other Level 2 discipline, including the receiving organization's capability, readiness dossier, and the decision required before

Transfer of Operational Control [8]. With this framework, lenders and insurers have full transparency into readiness risk throughout all phases of the project lifecycle.

In practice, the Level 2 disciplines produce evidence, expose deficiencies, and make readiness recommendations; they do not replace Level 1 authorization. The decision flow is evidence, independent review, readiness recommendation, residual-risk decision, and Outcome Authorization. This gives insurers and lenders common control points for early risk-engineering intervention, policy conditions, drawdown approval, completion tests, reserve release, and transfer of control - so gaps can be corrected before they become delay. If a loss occurs despite those controls, the records support DSU claim analysis.

What this changes for insurers, lenders, and owners

The ICxA Standards become useful when they change decisions, not when they simply add documents.

For underwriters, evidence of conformance can improve submission quality and support decisions on capacity, premium, attachment, DSU sublimits, risk-engineering conditions, and phased-handover requirements. The aim is not automatic credit for a certificate; it is visibility into the controls that reduce startup failures, premature start-up, and disputed transition points.

For lenders and their independent engineers, the same evidence can support due diligence, construction drawdowns, completion tests, reserve release, and the decision that an asset is ready to move from construction, to integration and startup, then into commercial operation [7]. Technical installation completion and operating systems can be assessed separately, with conditions and residual risk made visible rather than buried in a general completion statement.

For owners and brokers, a governed evidence trail differentiates a well-controlled project in a capacity-constrained market. It also gives financing and insurance teams a common view of system status, readiness conditions, and the support required through ramp-up.

Prevention is the primary purpose, but DSU claims benefit as well. A conforming project creates records as the work proceeds, covering system boundaries, test results, deficiencies, readiness recommendations, authorization decisions, operating capability, residual risk, System Handover, and Transfer of Operational Control. If a loss occurs, that record can help establish causation, concurrent delay, mitigation, and the point at which responsibility changed.

Precedent: independent verification for insurers

Offshore construction provides a useful comparison. A marine warranty surveyor independently reviews critical operations on behalf of insurers. The surveyor does not eliminate every failure; the value is that important decisions are made against defined criteria and supported by evidence. Independent verification of commissioning and operational readiness could play a comparable role for high-value data centre transitions, while leaving commercial risk acceptance with the owner, lender, and insurer.

The capital and risk implication

The final stages of a data centre project are not the administrative tail of construction. They are the point at which completed assets must become a reliable operating business. For boards and capital providers, the question is not only whether construction is complete, but whether the evidence supports energization, start-up, transfer of control, revenue service, and the release of capital tied to those milestones.

The market already has capital, specialist engineering, and sophisticated products. The opportunity is to connect them through the complete ICxA Outcome Governance framework. When the readiness gates, decision rights, operating capability, and evidence are used in underwriting and lender due diligence, uncertainty and risk become more visible to all parties, residual risk becomes explicitly documented rather than assumed, and well-governed projects can be recognized before a loss becomes catastrophic.

An invitation to collaborate

ICxA invites insurers, reinsurers, lenders, brokers, and independent engineers to review or pilot the framework on live data centre projects. For insurers, collaboration can improve early identification of commissioning and readiness risks, strengthen preventive risk-engineering interventions, and inform proportionate policy conditions and DSU capacity decisions. For lenders, it can provide more consistent criteria for identifying threats to completion before drawdowns, reserve release, or transfer to operations.

Organizations can help identify which governance controls materially reduce delay and transition risk. Participants gain a common evidence model that can be reused across underwriting submissions, due diligence, and project reviews. ICxA welcomes organizations interested in reaching that value.

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