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A FRAMEWORK BASED REVIEW OF INTERNAL COMMUNICATION IN THE ACTIVATION OF URBAN RAIL EXTENSIONS

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ABSTRACT

An urban rail extension can be physically complete and still unable to carry passengers, because the transition to service runs on a chain of confirmations rather than on construction progress. This review adopts the Antecedents-Decisions-Outcomes framework and reports its process following the SPAR-4-SLR protocol to synthesise evidence on the communication layer of that transition. From 423 records retrieved, screening produced a 34-item shortlist; the review cites 30 studies, 20 of them read in full text, together with four primary agency documents. Antecedents concentrate at the inter-organizational level: dispersed information ownership, configuration sets reaching 155,000 items, and a fixed public opening date that reduces visibility of assurance issues. Decisions divide into mechanisms that make status observable and those that assign responsibility, the strongest reported result being a transition designed as its own organisation at a major airport, with an opening six months ahead of plan. Outcomes expose the principal gap: no study attaches an outcome measure to the confirmation phase itself, although schedule, cost and defect measures exist on either side. The review proposes confirmation latency and resubmission rate as recoverable measures, and argues for treating accessibility criteria, which the literature already quantifies, as readiness conditions rather than service outcomes.

KEYWORDS: internal communication, operational readiness, urban rail, regulatory oversight.

1. INTRODUCTION

An urban rail extension reaches a state that project schedules rarely name. Track is laid, systems are installed, stations are built, and the line still cannot carry a single passenger. What stands between the finished asset and the authorised service is a chain of confirmations: testing evidence assembled, safety certification closed out, pre-revenue operations completed, an oversight body satisfied that the operator can run what has been built. That chain moves on information, and the information moves between organisations that describe the same asset in different vocabularies.

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Research on large infrastructure projects has mapped the phases on either side of this chain. The front end has its own review, covering 44 issues and 17 remedies drawn from 64 studies [1]. Organisation design across the megaproject life cycle has been surveyed across 141 articles [2]. Causes of poor performance have been catalogued as 18 causes matched to 54 cures from 86 full papers [3]. Digital internal communication has its own review in the communication literature, conducted outside any project setting [4]. The confirmation chain itself, and the communication work that carries it, sits between these bodies of work rather than inside any of them.

This review takes that chain as its object and asks what conditions put readiness coordination at risk, what practitioners choose to do about them, and what follows from those choices. The argument the synthesis supports is that coordination readiness deserves treatment as a control loop in its own right, distinct from construction progress and from the safety case it serves: on a project with a fixed public opening date, the layer that limits the date is often not the work but the confirmation that the work is done, and that layer is where better coordination can shorten the path to opening without relaxing any safety or oversight requirement. The contribution is threefold: per-axis synthesis matrices carrying an explicit judgement and a reported figure in each row; a map of what the field has not measured, in which the absence of any outcome measure attached to the confirmation phase is the central finding; and a practitioner-grounded reading of two conditions, status observability and accessibility, that the literature treats separately and that the confirmation chain binds together.

This review is written from inside the process it examines. It draws on direct involvement in the Federal Transit Administration's Oversight Procedure 54 readiness process on the Crosslake Connection, the Link light rail crossing of Lake Washington on the Interstate 90 floating bridge, which completed Sound Transit's 2 Line and opened to passengers on 28 March 2026 [5]. Announcing the opening date, Sound Transit describes that crossing as the first light rail on a floating bridge, and the Washington State Department of Transportation, quoted in that announcement, states that it now operates the only floating bridge in the world that carries light rail [6]. The readiness process examined here covers that crossing. Observations drawn from that involvement appear at three points below.

1.1 Activation as a management challenge

Activation names the work of turning a completed asset into an operating service. The commissioning literature treats it as a process rather than a phase: mechanical completion is not the objective, successful commercial operation is, and commissioning “flows through the project phases” rather than occupying the last of them [7]. Operability, on this reading, is an integration responsibility carried throughout delivery rather than a property discovered at the end.

Where a public regulator is involved, that process acquires a formal shape. In the United States, the Federal Transit Administration’s Oversight Procedure 54 defines readiness to enter service as the completion of System Integration Testing, fulfilment of safety and security certification requirements,

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completion of Pre-Revenue Operations, and confirmation that the sponsor or operator has the management capacity and capability to operate the new facility. The procedure names this bundle a Readiness Review and assigns its conduct to a Project Management Oversight Contractor, who assesses "the adequacy, soundness, and timeliness" of the sponsor's work across those four elements [8]. The agency's oversight framework places the review on a fixed clock: it should begin no later than nine months before the revenue service date and be complete no later than one month before it [9].

Two features matter for what follows. Three of the four elements are evidentiary rather than physical, since testing, certification and capability must each be shown, so the asset can be finished while the evidence is not assembled. And the review overlaps construction by months, which makes it a parallel process with its own deadlines rather than a gate placed after delivery.

The vocabulary needs care, because the terms overlap in ordinary use. Castañer and Oliveira [10] reviewed 372 articles on collaboration, coordination and cooperation, found 45 offering an explicit definition, and showed that the terms routinely define one another; their discriminating dimensions are the temporal stage and the type of goals involved. On that reading, what happens between a transit agency, its contractors and a federal oversight team is coordination: parties with distinct goals aligning actions in a defined stage rather than pooling resources toward a common goal. That leaves the phrase "internal communication" in an awkward position here. The work is internal in the sense that matters operationally, moving technical status among those responsible for delivering and accepting the asset, and not internal in the sense of belonging to one employer, arrangement inter-organizational governance research treats as a structure with its own mechanisms and failure modes [11].

2. MATERIALS AND METHODS

2.1 Analytical framework

The synthesis is organised by the Antecedents-Decisions-Outcomes framework [12], adopted from its authors and cited to them. The alternative Theory-Context-Characteristics-Methodology frame [13] was considered and set aside: the object here is a practice with drivers and consequences rather than a theoretically mature research field, and the corpus profile below shows a corpus too thinly theorised for a theory-mapping exercise to sort. Neither frame is presented as a contribution of this review. Applied here, the three axes read as conditions that make readiness coordination fail, choices actors make in response, and effects those choices produce, which is why the outcome axis carries the weight of the finding: a frame that asks what followed exposes an absence a frame that asks what was studied would not.

Process reporting follows the SPAR-4-SLR protocol [14], which asks for transparent reporting of what was actually done rather than for retrieval of the entire published pool. The corpus is bounded and purposive; no claim is made that it covers all published work on the topic, and the counts below are

reported as recorded in the screening log.

2.2 Search and screening

The domain was defined as the communication and coordination of readiness information during the transition of urban rail and comparable infrastructure from construction to operation, including the interface with an external oversight body. In the assembling stage, eleven queries were run against OpenAlex, which aggregates Crossref, PubMed and other indexes. Ten covered topical sub-domains, spanning internal communication in project organisations, the transition from construction to operations, operational readiness assessment, commissioning and handover, boundary objects and coordination, regulatory oversight and approval of transit projects, safety certification, common data environments, accessibility at public transport stations, and megaproject schedule performance under a fixed opening deadline. An eleventh probed for prior reviews on the review's own topic. The window was 2015 to 2026, with foundational works outside it admitted individually. Retrieval returned 423 unique records.

Arranging the pool began with deduplication by identifier, which removed no further items beyond those already merged during retrieval. Hard filters on publication year and the presence of an abstract reduced the pool to 357. Four inclusion criteria were then applied: peer-reviewed work; addressing communication, information flow, coordination or governance in infrastructure delivery, the transition from construction to operations, a regulatory or assurance interface on such projects, or accessibility as an acceptance criterion; offering evidence rather than commentary; and available in English. Screening retained 40 records, of which 34 entered the shortlist.

At the assessing stage, 21 studies were examined in full text, selected so that every axis rests on full-text evidence and the regulatory and accessibility strands are covered rather than inferred; the remaining shortlisted studies were analysed at the level of their reported results. Four primary and agency sources were read directly: Oversight Procedure 54, the Federal Transit Administration's oversight framework, and two Sound Transit press releases. Every figure reproduced below was located in the source text it is attributed to. Twenty-one studies were read in full; one proved unrelated to the topic on inspection and is not cited, leaving 20 full-text sources in the review. Eighteen of the 34 shortlisted records are cited. Twelve further studies were admitted individually rather than through the screen: the framework and protocol sources and the frame compared against them, four prior reviews used to position the gap, two conceptual sources fixing the terminology of coordination, two foundational works published before the year window, and one case study of the transition to operations identified while scoping. With the four primary and agency documents, the review cites 34 sources in total. Reporting follows fixed conventions: sources are cited by number in order of first appearance, figures from primary documents are cited to the issuing body and document title, and every statement resting on practitioner testimony rather than on a source is marked as such where it appears.

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One result of the search describes the gap the review addresses. The query phrased in the review's own terms, internal communication in project organisations, returned 40 records of which none met the inclusion criteria; operational readiness assessment returned 40 and retained none; the prior-reviews probe on the exact topic returned 39 and retained one. By contrast, commissioning and handover retained 12 and boundary objects retained seven. Because retrieval attributes each record to the first query that found it, these counts depend on query order, and the internal communication query ran first, so its zero is not an artefact of interception. Retrievable work adjacent to this topic exists, and it sits in the traditions of asset information handover and of boundary objects rather than in the vocabulary of communication or of readiness.

2.3 Corpus profile

Table 1: Profile of the full-text core (20 studies)

Dimension	Distribution
Publication years	2010–2024; 13 of 20 from 2020 onward
Publication communities	Project, operations and general management (10); construction and facilities management (5); rail, safety and rehabilitation (3); innovation and software engineering (2)
Research designs	Qualitative case study (9); literature review (7); conceptual or method paper (3); analysis of building information model data (1); experimental designs (0)
Largest evidence bases	75 interviews across three megaprojects; 49 interviews across three alliance projects and industry programmes; 31 interviews with 113 hours of observation
Geographic concentration	United Kingdom (5), China (2), Finland (1), Norway (1); one three-site comparison (Airbus, CERN, Crossrail)
Recurring cases	Crossrail, London (a case in three studies); Beijing Daxing International Airport (the most detailed single case)

The publication communities in Table 1 rarely cite one another, which is part of why the confirmation chain has been described piecemeal. The absence of North American transit activation cases is itself part of the gap this review maps, given that the readiness procedure examined here is a United States federal instrument.

The corpus is also thinly theorised, which bears on the choice of frame. Zani et al. [2], coding 141 articles on megaproject organisation design, found organisational theory in 36 studies, institutional theory in 15, stakeholder theory in 10, contingency theory in nine, transaction cost economics in eight and complexity theory in seven. That distribution describes the adjacent field rather than this one, and it represents the upper bound of theoretical density available here: the studies closest to the confirmation chain, including those on commissioning, handover and asset information, carry no explicit theoretical framing at all.

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3. RESULTS

3.1 Antecedents: what puts readiness coordination at risk

The conditions that put the confirmation chain at risk operate at three levels. Individual-level conditions concern how one actor holds and transmits status; organisational conditions concern how a delivery organisation structures its information; inter-organizational and regulatory conditions concern what passes between the sponsor, its contractors and the body that must be satisfied. The corpus is weighted toward the third level, which is where the confirmation chain lives.

Table 2: Antecedents of readiness-coordination risk

Antecedent	Level	Evidence	Figure	Transfer
Information ownership dispersed across designers	Inter-org	Whyte & Lobo [15]	600+ designers, 20 locations, 4 sections, 2 consortia	Direct. The split is where status claims diverge
Volume of items needing individual status	Org	Whyte et al. [16]	155,000 items, projected to 600,000	Direct. Scale turns tracking into observability
Number of independent parties	Inter-org	Oliveira et al. [17]	40 organisations per project (SD 13.46)	Direct. Each party adds a boundary
Fixed opening date suppressing visibility, with assurance run on fragments	Inter-org	Muruganand an et al. [18]	Dec 2018 commitment; ~90 critical systems rooms per station; "an assurance process for bits of it"	Direct, and the closest row to this review's thesis. Fragmented assurance multiplies claims without adding certainty
Structural cost and schedule exposure of rail	Org	Flyvbjerg et al. (2003) and an earlier 1988 study, both as cited in [19]	44.7% cost overrun rail vs 20.4% roads; 88% cost growth, 17% slippage across 52 projects	Context, not mechanism
Defect cost concentrated at handover	Org	Too et al. [20]	40%–55% of defect cost at handover	Direct. Locates exposure in the phase
Information failing to reach the operator	Org	Rogage & Greenwood [21]	29% handed a usable model to operations; O&M up to 80% of lifecycle cost	Partial. Asset data, same discontinuity
Attention concentrated at the front end	Org	Babaei et al. [1]	Front end up to 35% of cost; 44 issues, 17 remedies	Explains neglect of the back end
Conceptual confusion about coordination	Individual	Castañer & Oliveira [10]	45 of 372 articles defined a term; 12 definitions of coordination	Direct. Same interface, different constructs

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Antecedent	Level	Evidence	Figure	Transfer
Hazard workload preceding certification	Inter-org	Hessami [22]	101 passenger and 119 worker hazards; 12-phase life cycle	Direct. Certification evidence is itself a status set
Accessibility deferred to programme end	Org	Unsworth et al. [23]	31% of people with disabilities in the United States report limited transport access	Direct. Treated as a readiness criterion in the Discussion

Two of these rows carry more than their figures. At the scale Whyte et al. [16] report, the question stops being whether a party can find a document and becomes whether any party can state what proportion of the set is complete, because a confirmation chain runs on statements about documents rather than on the documents themselves. On the Crosslake Connection the same question took this form: with submissions moving between the agency and the federal oversight team, the standing challenge was to maintain one consistent, shared view of where each submission stood, and wherever the two parties' views diverged, the same item drew duplicate follow-up. This is practitioner testimony from that readiness process, not a measured finding. And the fixed date, in the accounts Muruganandan et al. [18] gathered, did not merely compress the work; it changed what people were willing to report, degrading the status information the chain depends on. That is the one point at which the corpus states the present thesis directly rather than by implication. Set against these, the front end absorbing up to 35% of project cost while 40% to 55% of defect cost falls at handover shows an asymmetry between analytical attention and financial exposure that explains why the back end lacks a comparable diagnostic vocabulary.

Three further strands converge on the same point. Fellows and Liu [24] argue that specialisation in engineering construction produces fragmentation across organisational interfaces, and that the boundaries between them, rather than the work inside any of them, are where performance is lost; the account is conceptual but names the condition the quantitative studies describe piecemeal. Tan et al. [25] locate knowledge and information gaps at the handover between construction and occupancy. Kim et al. [26] name the corresponding activity, information commissioning, the conversion of a project information model into one fit for the operator, undertaken without formal information requirements and at substantial effort. None extends to the evidentiary chain a regulator must be satisfied by. Where delivery runs through public-private partnership the same interface appears in commercial terms, with Li et al. [27] identifying partner synergy as a condition of value creation beyond basic project objectives.

3.2 Decisions: what practitioners choose to do about it

The decisions recorded in the corpus fall into two families. One makes status observable by creating an artefact that several parties read the same way; the other makes responsibility explicit by creating roles, schedules or governance structures that assign who confirms what and when. The families are

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complementary, and the studies reporting the strongest results combine them.

Table 3: Decisions available in the readiness phase

Mechanism	Problem addressed	Evidence and figure	Boundary condition	Verdict under oversight
Shared artefact readable across boundaries (boundary object)	Divergent readings of the same status	Caccamo et al. [28]: 1,464 records screened to 87; seminal pair holds 3,065 WoS citations. Whyte & Lobo [15]	Plastic enough per party, robust enough to hold one identity	Strong. Sponsor and regulator need a shared object because their goals differ
Configuration management over the change set	Loss of control over the current state	Whyte et al. [16]: 155,000 items under control	Established before volume peaks	Strong. Applies directly to certification evidence
Standardised handover route with fixed lead time	Handover improvised at the end	Too et al. [20]: 12-week window; one case ran a 15-day route to contract with no handover plan	Client specifies the route; contractors will not impose it	Good. The procedure supplies the lead time these studies find missing
Transition to operations designed as its own organisation	Delivery and operations treated as sequential	Zhang et al. [29]: 3 stages; one set of people over two institutions; 17 months observed; 56 entities interviewed	Authority spanning both organisations	Strong. The only case in the corpus reporting a schedule gain
Collaborative governance (project alliancing)	Adversarial sponsor-contractor interfaces	Aaltonen & Turkulainen [30]: 50+ projects by 2020, over €5bn, above 10% of the national market	An institutional field accepting the contract form	Partial. Alters the contractual interface, not the regulatory one
Explicit inventory of coordination mechanisms	Coordination left implicit	Berntzen et al. [31]: 27 mechanisms in 3 categories	Drawn from software delivery; transfer untested	Promising. The category structure maps across unmodified
Hazard log and staged safety life cycle	Certification evidence assembled late	Hessami [22]: 12 phases; 101 and 119 hazards logged	Early commitment to one record	Strong. A boundary object in all but name
Integrated testing of safety and signalling	System integration deferred to the end	Yan et al. [32]: method spanning safety management and signalling for CBTC	Specific to signalling architecture	Good. Operationalises the first element of the definition
Regulator-side review on a fixed clock	Approval treated as an endpoint	[8], [9]: begins ≤9 months before service date, complete	Where the framework designates the review	Definitional, not optional. The question is whether information keeps pace

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Mechanism	Problem addressed	Evidence and figure	Boundary condition	Verdict under oversight
		≤1 month before		

Two mechanisms carry the change this review argues for. Whyte and Lobo [15] describe digital objects that render judgements visible to the parties who need them, including a drawing rejected by an approval's authority becoming visible along with the reasons for rejection. Caccamo et al. [28], reviewing 87 contributions, characterize the general form: an object each community uses on its own terms while it retains a common identity across them. A shared status register between a sponsor and an oversight team is a boundary object of this kind, read by the engineering team as a list of deliverables, by the communications function as a reporting position, and by the oversight team as an audit trail, while the identity of each entry stays constant. On the Crosslake Connection that register took the form of a single visual checklist of document statuses used by both the agency and the federal oversight team, each item showing whether it had been submitted, reviewed, or was still awaited. The checklist gave the two parties unified control of the readiness documentation, since both worked from the same statuses. This account is practitioner testimony, not a measured result. A second observation from the same work concerns what a register should show. A tracker in which every item reads green reports completed work while the decision at hand depends on outstanding work, so presenting what is missing turns the register from a record into an instrument. The corpus does not test this, and the research agenda records it as a gap rather than a finding.

Zhang et al. [29] provide the fullest account of the second mechanism, designing the transition itself. On Beijing Daxing, 45 sub-projects with 74,000 people at peak, the transition was designed across three stages with one set of people carrying authority in both the delivery and the operating institution, and the airport entered service six months ahead of its original plan. The study is a single longitudinal case and does not isolate the transition design from other factors, but it establishes that the transition can be designed as an object of management and reports a schedule outcome that is otherwise rare. Aaltonen and Turkulainen [30] show the institutional route to the same end, with project alliancing in Finland growing from zero to more than 50 projects and above €5 billion by 2020, over 10% of the national infrastructure market. That mechanism reshapes the sponsor-contractor interface and leaves the sponsor-regulator interface untouched, which is why it supports the argument by analogy rather than by extension. Assigning responsibility across organisations is itself contested work: Bos-de Vos et al. [33] identify three forms of boundary work through which professionals respond to marginalisation, namely reinstating, bending and pioneering role boundaries. The activation coordinator's position sits in the third, since the role has no established boundary to reinstate, so who confirms status is negotiated afresh on each project.

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3.3 Outcomes: what is measured, and what is not

The outcome axis either finds a body of measured effects or reports their absence. Here it reports absence, and the absence is specific: outcomes are measured for the project as a whole and for the service once running, but not for the confirmation phase that separates them.

Table 4: Outcomes reported in the corpus

Outcome construct	How operationalised, magnitude and design	Phase measured	Verdict
Opening achieved ahead of plan	Calendar comparison against the original plan: 6 months early at Beijing Daxing; single longitudinal case [29]	Transition to operations	**Measured and attached to transition design.** The only such case
Schedule slippage	Percentage against baseline: 17% mean across 52 projects, relayed in [19]; secondary analysis	Whole project	Measured, not attributable to any phase
Cost overrun	Percentage against baseline: 44.7% rail, 20.4% roads [19]	Whole project	Measured, not attributable to any phase
Defect cost	Share of total defect cost: 40%–55% at handover; three-case study [20]	Handover	**Measured and located in the phase.** Closest existing proxy
Disruption incidence and type	Counts by category: 192 disruptions across 7 cases, 104 misspecification, 88 temporal misallocation; 3,700+ pages of documents [17]	Construction	Measured, upstream of readiness
Information continuity into operations	Share of producers handing over a usable model: 29%; 112 models analysed [21]	Handover	Measured; asset data rather than readiness status
Coordination mechanism use	Inventory and categorisation: 27 mechanisms in 3 categories; 113 hours observed [31]	Ongoing delivery	Described, not evaluated. No effect estimate
Accessibility of the delivered service	Incident rate and anthropometric fit: 4.6% of ramp deployments involved incidents; 59.4% fit the current clear floor area against 95% with a larger one; 26 studies [23]	In service	Studied after opening, not as an acceptance condition
Quality of the sponsor-regulator interface	No measure identified	Not measured	**Absent.** No study operationalises it
Latency of the confirmation chain	No measure identified	Not measured	**Absent, and this is the central gap.** No study measures the interval between completion and confirmed readiness

The final two rows carry the principal finding. Of the studies reporting outcomes at all, none attaches

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an outcome measure to the confirmation phase. Schedule and cost are measured across the project, where the readiness contribution cannot be separated from construction. Defect cost is located at handover, which is the nearest the field comes. The studies that measure service quality and accessibility do so after opening. The interval this review argues is both consequential and tractable has no reported measure attached to it anywhere in the corpus.

The shape of that absence is not the ordinary case of a young topic awaiting study. The adjacent phases acquired their measures by being named as objects of management first. Cost overrun became measurable once the front end was treated as a decision stage with its own baseline, which is what allows the sector comparison of 44.7% for rail against 20.4% for roads that [19] relays from Flyvbjerg et al. (2003). Defect cost became locatable once handover was treated as a process with a start and an end, which is what allows Too et al. [20] to place 40% to 55% of it there. The confirmation phase has a start and an end fixed by an external procedure, and an authority that records every transaction within it, yet no construct has been attached to it. The consequence for practice is that decisions about where to intervene in the readiness period are made without evidence about which interventions work, and the mechanisms in Table 3 are adopted on the strength of their plausibility rather than their measured effect. That is a defensible position for a field still establishing its constructs. It is a weaker one for a field that has been delivering these projects for decades.

4. DISCUSSION

4.1 Coordination readiness as a control loop

Read across the three axes, the material describes a loop rather than a sequence. Physical work generates evidence; evidence acquires a status; status is exchanged between the sponsor and the oversight body; the exchange produces either an agreed confirmation or a return for rework, and the return re-enters the work. The loop closes when the confirmed set satisfies the four elements of the readiness definition and the service can open.

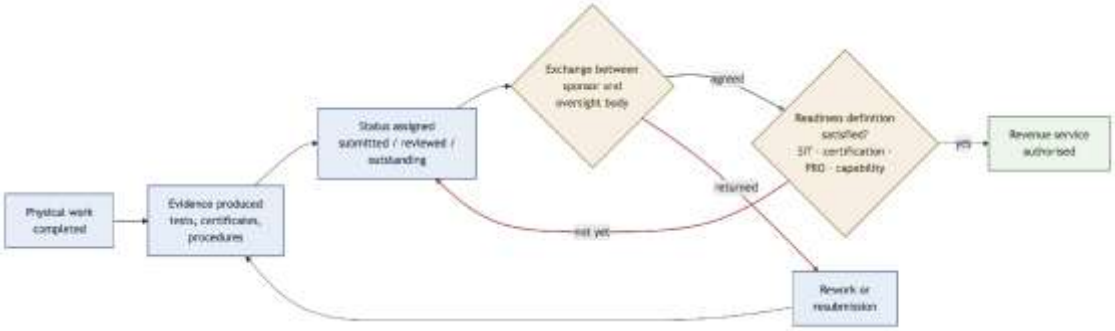


Figure 1: The coordination readiness loop. Two return paths are shown in red. The gate lists the four elements of the readiness definition: System Integration Testing, safety and security certification, Pre-Revenue Operations, and management capacity and capability [8]. The review window runs from no later than nine months before the revenue service date to no later than one month before it [9]. Two

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quantities on this loop have no reported measure in the corpus: the elapsed time from submission to agreed status, and the share of submissions returning for a further cycle.

Three properties follow from the corpus. The loop has its own clock, and it is not the construction schedule: the review runs from nine months before the service date to one month before it, so a project can be on programme for construction and behind on confirmation, with the second condition governing the opening date as firmly as the first. Its state variable is status rather than work, since what travels around it are claims about whether each item has been submitted, reviewed, or is outstanding; past the 155,000 items Whyte et al. [16] report, the object of management shifts from the artefacts to the register of their states, which is why registers, logs and shared objects work here where reports do not. And its dominant failure mode is loss of observability rather than of capability: Muruganandan et al. [18] locate the Crossrail failure at systems integration, where a fixed date reduced visibility and assurance ran on fragments rather than whole assets. The corpus contains no case in which the loop degraded because a party lacked the technical capacity to do the work.

Naming the loop has a practical consequence. If confirmation is a phase, its problems are scheduling problems and the response is to start earlier; if it is a control loop, they are observability problems and the response is to instrument the state. The mechanisms in Table 3 that address observability, namely the shared register, configuration control and the hazard log, are the ones the corpus associates with settings that went well; those addressing sequencing alone are not.

4.2 Accessibility as a readiness criterion

Accessibility appears in the corpus as a service quality attribute measured once a line is running. Treating it instead as one of the conditions confirmed before opening changes what the confirmation chain has to carry, and the accessibility literature supplies the thresholds that make the change practical.

Unsworth et al. [23], reviewing 26 studies, report criteria of exactly the kind a readiness review can test. A higher proportion of ramp incidents occurred where the slope exceeded the 9.5 degree maximum allowable under the Americans with Disabilities Act, with incidents concentrated where the ramp deployed to street level at 11.4 degrees compared with 4.2 degrees to a kerb. A clear floor area of 860 mm by 1480 mm would accommodate at least 95% of wheeled mobility users, against 59.4% who fit the dimensions currently specified. Ramp-related incidents occurred in 4.6% of the deployments studied. In the United States, 31% of people with disabilities report limited access to transportation. These are pass-or-fail thresholds with numbers attached, the same kind of statement as a test result or a certification closure, and nothing about them resists inclusion in an evidence set alongside the other elements of a readiness review.

One proposition follows from how readiness is defined and is not tested in the corpus: an item without a measured acceptance condition is the easiest to defer when a schedule tightens, so accessibility is

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exposed to deferral for as long as it is held as a general commitment and not as a tested criterion. The practical test of whether it belongs in the definition of readiness is whether a person without local knowledge and with additional access needs can complete the journey safely on the first day of service. What the corpus does establish is that the usual objection to treating accessibility this way, that it is too qualitative to serve as an acceptance condition, is answered by the thresholds reported above. Zając [34] reaches a compatible conclusion from the design side, treating universal design as a specifiable system property rather than an accommodation added afterwards. In the studies reviewed, the gap is one of placement rather than measurement: they quantify these criteria and assess them after opening, and none examines them as a condition of opening.

4.3 A research agenda

Table 5: Gap map with candidate research designs

Gap	Why it persists	Candidate design
No outcome measure for the confirmation phase	Schedule and cost are measured at project level, where the readiness contribution cannot be separated	Retrospective multi-project study computing confirmation latency and resubmission rate from oversight correspondence against opening-date variance
Sponsor-regulator interface unstudied as an object	Governance research treats the sponsor-contractor interface, regulatory research treats compliance outcomes, neither the exchange	Comparative case study under one oversight procedure, with the document exchange as the unit of analysis
Effect of status-register design untested	Boundary object research established the mechanism but not in a regulated readiness setting; registers are internal documents	Quasi-experiment across one sponsor's projects before and after a shared register, resubmission rate as dependent variable
Registers showing outstanding rather than completed items untested	Originates in practice, has not entered the literature	Controlled study of decision quality under two presentations of the same readiness data
Accessibility not examined as an acceptance condition	Accessibility research measures service outcomes; readiness research does not enumerate accessibility criteria	Documentary study of readiness evidence sets, coding whether accessibility criteria appear
No case evidence for the procedure in its own jurisdiction	A United States federal instrument, while the case literature concentrates in the UK, Europe and China	Case series on projects completing readiness review under the procedure

Two candidate measures follow from the material without requiring new instrumentation. Confirmation latency is the elapsed time between a deliverable being submitted and its status being agreed by both parties, aggregated across the evidence set; the oversight framework already supplies the boundary conditions, and latency measured against that window converts a qualitative worry about slippage into a quantity a sponsor can track weekly. Resubmission rate is the share of submissions

requiring a second or subsequent cycle, and its diagnostic value comes from what it separates: a high resubmission rate with low latency indicates a specification problem, in which parties agree quickly that the wrong thing was submitted, while low resubmission with high latency indicates a capacity or attention problem on the reviewing side. The two together distinguish failure modes that a single schedule-variance figure collapses into one.

Both are recoverable from records that regulated projects already keep, which is what makes the gap notable: it persists not because the data are unavailable but because the phase has not been treated as an object of measurement. The first gap constrains the other five, since until confirmation latency or an equivalent construct is measured, claims about which mechanisms improve readiness coordination, including the claims organised here, remain claims about mechanism rather than about effect. The sixth compounds it: a procedure administered in one jurisdiction has generated no peer-reviewed case evidence, so the mechanisms in Table 3 are assessed for their fit against a procedure the corpus has never observed in operation. Closing that gap requires access rather than a new method, since the projects exist, the reviews have been conducted, and the records are held by sponsors and oversight contractors rather than by researchers.

4.4 Limitations

Four limits bear on how the synthesis should be read. The corpus is bounded and purposive: eleven queries against one aggregating index within a defined window, yielding a 34-item shortlist of which 18 are cited, with grey literature from transit agencies and oversight contractors unrepresented. Depth is uneven by design, since 20 of the 34 cited sources were read in full text while the remainder were analysed at the level of their reported results, so the coding of those studies carries more uncertainty. One directly relevant source could not be examined in full text: Tkalac Verčič et al. [4], the only review of digital internal communication the search located, is cited for its existence and scope rather than for any finding, which limits the internal communication strand specifically. And the practitioner layer illustrates rather than demonstrates: the three observations drawn from the Crosslake Connection readiness process are marked where they appear, and none carries a claim of measured effect.

5. CONCLUSION

The transition from a completed urban rail extension to an authorised passenger service runs on a chain of confirmations that behaves as a control loop, with its own clock, its own state variable and its own failure mode. That loop has been described piecemeal across several research communities that rarely cite one another, and has not been measured by any of them. The two conditions this review examined most closely, the observability of readiness status and the placement of accessibility criteria, are both cases of the same structural problem: information that exists, in a form that could be confirmed, arriving at the decision too late to change it.

Extensions of this kind will continue to be delivered against dates announced years in advance, and

against engineering that grows more distinctive rather than less. Whether they open on those dates will depend, in part, on a layer of work the research literature has so far described without measuring. Naming that layer is the first step: a confirmation chain treated as a phase invites the response of starting earlier, while the same chain treated as a control loop invites the response of instrumenting its state. The second step costs less than it appears, because the records that would support the measurement already exist on every project that has passed through a formal readiness review. Until they are used, decisions about where to intervene in the readiness period will keep resting on plausibility rather than on evidence.

DECLARATIONS

Conflict of interest. The author is employed by RailPros Inc. and, at the time of writing, is assigned full time to the Asset Transition Office of Sound Transit, the agency whose Crosslake Connection project this review refers to, and served as coordination lead for the Oversight Procedure 54 readiness process on that project. The observations of that readiness process reported in the Results draw on this professional experience. No internal Sound Transit documents were consulted, quoted, or reproduced; the treatment of the project rests on the publicly available agency and federal materials cited below. Neither RailPros Inc. nor Sound Transit commissioned, funded, reviewed, or approved this review, or had any role in its design, source selection, or preparation.

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Data availability. All sources analysed are published works or publicly available agency documents, listed in full in the reference list. No new data were generated.

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