

Completed Work, Unresolved Cash

Sample Diagnostic report: contract evidence, operating decisions and the route to billing.

Sample Diagnostic report · Executive Systems Diagnostic

Decision: how should a project-service business reduce the cash tied up between completed work and valid invoicing without increasing disputes or financing unrecoverable scope?

This report uses a constructed company and dataset to demonstrate the analysis and decision package. The business has \$24 million in annual revenue. The examined flow is \$14.4 million of completed project work annually; other revenue is outside the question. All company amounts, operating observations, targets and costs below are model inputs, not customer results.

The immediate decision is whether to fund more billing staff, buy a broad automation platform or correct the specific causes of the queue. The recommended first commitment is a controlled correction of evidence capture, commercial decisions and exception ownership, using the existing systems where they can support the required controls.

The recommended pilot uses manual coordination. It targets an 11.4-day interval from completed work to a valid invoice and a \$396,000 working-capital release. Targeted integration would require a further investment decision. If its targets are achieved, the average interval falls from 18 to 8.6 business days and the unbilled balance falls from \$1.080 million to \$516,000. The resulting \$564,000 is a potential one-time working-capital release. It reaches the bank account only if valid invoices lead to earlier customer payments. The financing benefit then depends on how that cash is used. The report tests weaker outcomes as well as those targets.

1. Executive finding and decision

The event calculation places 14 of the 18 value-weighted days before invoice eligibility and four after it. The queue combines four kinds of work that require different authority. Clean jobs wait for a weekly review. Documentation exceptions wait for a customer record or correct order match. Scope changes wait for a commercial decision. Acceptance disputes wait for customer resolution. A common “completed” status conceals these differences.

The business is measuring physical completion in operations and invoice readiness in finance. Project managers receive credit for closing work; finance inherits exceptions that it cannot resolve. Added scope can reach the field before the customer has authorized the charge. Increasing billing throughput alone would leave the commercial and evidence constraints in place.

Begin with manual coordination in one project team. It creates an explicit invoice-eligibility record, captures the required evidence where the work occurs and sends each exception to a person able to resolve it. Establish the commercial decision before committing further added scope. Remove weekly batching for complete, eligible work only after the approval controls are verified.

Defer a broad platform purchase until the pilot shows whether the current systems can maintain the control and where manual effort remains. A limited interface or document-assistance function may be sufficient. Additional review capacity becomes justified if clean, eligible work continues to wait after preventable exceptions have been removed.

Manual coordination has a modeled annual benefit of \$23,700 after ongoing control cost, against \$12,000 upfront. Targeted integration adds \$10,600 of annual benefit for another \$16,000 upfront. Its incremental simple payback is 18.1 months once both options reach full performance. That extra investment needs evidence that the further reduction in delay is attainable. If delay remains near the current level, a technically successful implementation can still fail financially.

Leadership decision	Evidence required before commitment
Authorize the limited operating pilot	Agreed contract rules, reconciled baseline and named exception owners
Buy targeted automation	Measured residual manual burden; acceptable field-level accuracy and exception controls
Add review capacity	Eligible-work queue persists after rework and batching corrections
Expand the change	Valid invoices accelerate; customer disputes do not worsen; collection timing confirms value

2. Baseline: separate the queues before valuing them

The model contains 60 completed jobs worth \$1.2 million in a month with 20 business days. Average flow is therefore \$60,000 per business day. Values below represent shares of that flow, not a snapshot of accounts receivable.

Jobs are assigned to the first binding reason that prevents invoice issue. Each job appears in one cohort, avoiding double counting when it has several defects. Once that reason is cleared, any subsequent hold remains visible. The 18-day baseline is value-weighted: 40% × 4 days + 30% × 18 + 20% × 35 + 10% × 40. The target column below describes the targeted-integration option; the manual pilot is compared later in the report.

The clock starts when the contractual milestone is physically complete. Contract eligibility and internal processing have separate timestamps. An invoice can be issued only after the remaining contractual requirements are met. This model assumes a valid invoice is issued and accepted by the customer’s billing channel at the same time. Real operating records must retain both timestamps and any rejection or resubmission.

At a stable flow, \$60,000 × 18 days implies \$1.080 million held before invoice issue. This is a planning relationship; the actual baseline would be reconciled to the job ledger and daily unbilled balances. Seasonality, uneven job values, milestone terms and a changing backlog can invalidate a simple average. The model assumes the scope and dispute cohorts are ultimately recoverable at the stated amounts. A denied fee or write-down reduces the amount recoverable and therefore the cash benefit.

First binding cause	Monthly flow	Baseline days	Target days
Complete evidence; queued review	24 jobs / \$480,000 / 40%	4	2

First binding cause	Monthly flow	Baseline days	Target days
Evidence missing or mismatched	18 jobs / \$360,000 / 30%	18	6
Additional scope unresolved	12 jobs / \$240,000 / 20%	35	15
Customer acceptance disputed	6 jobs / \$120,000 / 10%	40	30
Value-weighted total	60 jobs / \$1,200,000	18.0	8.6

3. Why the same problem survives repeated expediting

The model separates physical completion from the point at which all required evidence and authority exist. An invoice becomes eligible only when its evidence, commercial authorization and customer acceptance conditions are satisfied. These are parallel prerequisites: their waiting times cannot simply be added together.

Of the 18 value-weighted days, 14 occur before eligibility: 77.8% of the elapsed interval. Four days fall after eligibility. Increasing billing capacity alone would leave the earlier holds in place. The records contain elapsed time but no measure of active review effort, so they cannot establish whether staffing is adequate.

Two documentation records demonstrate why even a reason category is insufficient. In S025, the document arrives 14 business days after completion. In S037, it arrives after two days but does not become usable against the order until day 14. Both records spend 14 days awaiting usable evidence. One requires better capture; the other requires a matching correction. Sending both to a faster billing clerk would preserve their first constraint.

S043 has its document after one day but waits 31 days for commercial authority. S055 has documentation after four days but reaches customer acceptance after 36. A document-extraction tool alone cannot produce either missing decision. The operating design must identify who can resolve the hold and what that person needs.

The exhibit below reports business days from each job's physical completion. Individual post-eligibility intervals vary; their value-weighted cohort average is four days.

Job / first hold	Document arrives	All requirements ready	Valid invoice accepted
S001 / review queue	0	0	5.4
S025 / source capture	14	14	19.4
S037 / order mapping	2	14	19.4
S043 / commercial authority	1	31	36.4
S055 / customer acceptance	4	36	41.4

4. What the record checks establish

The working model contains 60 jobs totaling \$1.2 million, seven events for each job and seven alternative scenarios. The calculation reconciles the job values, cohort totals and event chronology. It computes eligibility from the latest required prerequisite and preserves the source-capture versus matching distinction. The alternative file contains 420 job-level results that can be traced back to the same inputs.

The staff-only test changes one assumption: reduce the interval after eligibility from four to two days while leaving upstream conditions unchanged. The full interval falls from 18 to 16 days. Under the base cash assumptions, that supports \$120,000 of potential working-capital release and \$9,000 of annual gross interest avoided before any added staffing cost.

Even eliminating every day after eligibility leaves 14 days upstream. That theoretical ceiling supports \$18,000 of annual gross interest benefit before staffing or operating cost. It bounds what a review-only investment could earn from this particular financing mechanism; it does not dismiss other measured benefits of adequate staffing.

A second test improves technical matching and review while leaving the commercial and acceptance holds unchanged. The result is 13 days and \$14,500 of annual net recurring benefit under the targeted option’s cost assumption. The combined manual operating correction produces \$23,700. The technical-only result is therefore worse despite faster record handling.

The comparisons support starting with evidence and commercial coordination, then measuring the processing work that remains. A staffing decision also needs active review times, arrival variability and the effect of other assigned work.

Performed comparison	Result	Decision consequence
Halve only the post-eligibility interval	18 to 16 days; \$9,000 gross annual interest	Price any staffing remedy against the limited financing benefit
Remove all post-eligibility delay	18 to 14 days; \$18,000 gross annual interest	Upstream requirements remain the larger exposure
Improve technical handling only	13 days; \$14,500 annual net benefit	Matching alone does not justify the integrated-case return
Manual coordination and evidence controls	11.4 days; \$23,700 annual net benefit	Preferred first commitment on the modeled cost and timing

5. A workable operating design

Record when physical work is complete, contractual evidence is complete, commercial authority is in place, the invoice is approved and issued, the customer has accepted the invoice, and cash is received. Keep these events distinct even if the existing system displays them in one work record. Required acceptance of the work remains a condition for invoice eligibility.

Before the field visit closes, the supervisor checks the evidence required for that customer and milestone. The project manager resolves scope differences and confirms the authorized amount. Finance validates the

accounting and tax treatment, then approves issue. An exception has one current owner, a reason, a next action and an escalation date. Ownership follows the person able to remove the hold.

Show physical completion and invoice readiness together. Assess invoice speed alongside first-pass acceptance, credit notes and disputes. Record customer decisions as external holds and assess employees on the quality and timing of the actions they can control.

Keep the daily review short by concentrating on material exceptions. Review clean work through the normal approval path. Escalate old, valuable or contract-sensitive exceptions with the supporting records ready. If a manager overrides the recommended action, record the reason so the business can learn whether the rule or the exception judgment was better.

Decision or handoff	Accountable role	Evidence/control
Work and required acceptance captured	Field supervisor	Customer-specific evidence attached to correct milestone
Added scope and commercial position resolved	Project/commercial manager	Authorized amount; customer decision; unresolved exposure
Invoice issue approved	Finance approver	Valid source evidence, terms and accounting checks
Rule or mapping changed	System owner with finance/process approval	Versioned rule, regression set and rollback
Pilot expanded or stopped	Executive sponsor	Operating results and financial conditions reviewed together

6. Where analysis and automation earn their place

The event model provides a concrete first analysis. For each job, it calculates when the required conditions become true, then measures the interval to a valid invoice. A separate comparison changes only the review interval. Another changes technical handling while preserving commercial and acceptance waits. The differences show which modeled benefits depend on people resolving an operating or commercial hold.

The manual, targeted and broad-platform options then alter the stated stage assumptions and apply the same financial rules. The model recalculates every job before aggregating the result. The full targeted result depends on earlier commercial decisions and acceptance as well as record handling. If those changes do not occur, the technical-only scenario is the relevant comparison.

The next analytical extension would be a queue replay using actual arrival times, active work durations, rework and available qualified staff. Those inputs are not contained in this sample, so the model does not claim a staffing forecast or an optimized schedule. A real Diagnostic would select that extension when capacity remains a material competing explanation.

For an implementation, retain the same event definitions and exception ownership. Use deterministic checks for consistent identifiers and totals. Document extraction or matching assistance can address a measured burden in variable records, while ambiguous matches go to review. Commercial entitlement and unusual exceptions remain with the authorized decision maker.

Before changing production behavior, freeze the proposed rule and test it on later work not used to design it. Keep all events from the same job together, include still-open work and use only information available at the original decision. Compare the proposal with the practical manual option. Preserve the source and override reason so future results can improve the rule.

7. Compare the remedies against the causes

The recommended first commitment is a manual coordination and evidence-control pilot. It addresses the modeled causes and measures the work that might justify automation later.

The three options below use the same monthly flow, payment assumptions, 75% debt use and 10% borrowing rate. The four target intervals correspond to clean review, evidence exceptions, scope changes and acceptance disputes. The event model computes the result of these explicit stage-change assumptions for all 60 jobs. The pilot tests whether those target intervals are achievable. Upfront totals include the same \$5,800 Diagnostic once in each mutually exclusive option.

Manual coordination has the lowest estimated upfront cost and fastest simple payback. Targeted integration produces another \$168,000 of potential cash release and \$10,600 of annual net recurring benefit, but costs \$16,000 more upfront. Broad replacement is inferior to targeted integration on the modeled upfront and recurring-benefit measures; other material business benefits would need their own evidence.

Begin with the manual pilot. Consider targeted integration after measuring persistent matching or extraction work and validating the additional delay reduction. If the business later moves from the pilot to automation, distinguish reusable work from transition cost; the \$16,000 comparison is not a quotation for that transition. A broad purchase is not justified by this billing problem alone on the stated assumptions.

Option / four cohort intervals	Release / annual net benefit	Upfront / steady payback
Manual coordination: 2 / 9 / 22 / 35 days	\$396,000 / \$23,700	\$12,000 / 6.1 months
Targeted integration: 2 / 6 / 15 / 30 days	\$564,000 / \$34,300	\$28,000 / 9.8 months
Broad replacement: 1 / 4 / 12 / 27 days	\$678,000 / \$26,850	\$85,000 / 38.0 months

8. Financial model: value the specific delay removed

For the manual option, the weighted interval is $40\% \times 2 \text{ days} + 30\% \times 9 + 20\% \times 22 + 10\% \times 35 = 11.4$ business days. At \$60,000 per business day, the implied balance is \$684,000 and the reduction from baseline is \$396,000. Applying 75% to debt at 10% avoids \$29,700 of annual interest; subtracting \$6,000 of ongoing control cost leaves \$23,700 before tax.

For the targeted integration, the weighted interval is 8.6 days and the implied balance is \$516,000. The difference from the \$1.080 million baseline is \$564,000. This is a potential one-time reduction in working capital. It assumes invoices remain valid and customers pay the same interval after receipt. Contractual payment calendars, new disputes or an offsetting rise in receivables reduce the cash advance. Actual invoices must be followed through payment.

Applying 75% of that release to debt reduces borrowing by \$423,000. At 10%, full-year interest avoided is \$42,300. Subtract \$8,000 of annual control and support cost for a recurring benefit of \$34,300 before tax. The table below makes that targeted option's calculation reproducible.

The comparison includes the financing benefit only. Payroll savings, new sales, recovered change-order revenue and bad-debt reduction would each need separate evidence. Any recovered fee must be assessed after incremental delivery and collection costs and checked for overlap with the existing flow.

Financial bridge	Calculation	Result
Current modeled unbilled balance	$\$60,000 \times 18 \text{ days}$	\$1,080,000
Target modeled unbilled balance	$\$60,000 \times 8.6 \text{ days}$	\$516,000
Potential one-time working-capital release	$\$1,080,000 - \$516,000$	\$564,000
Assumed debt reduction	$\$564,000 \times 75\%$	\$423,000
Annual interest avoided	$\$423,000 \times 10\%$	\$42,300
Annual control/support cost	Planning estimate	(\$8,000)
Recurring benefit before tax	$\$42,300 - \$8,000$	\$34,300

9. Cost, timing and conditions that change the recommendation

The manual option assumes \$12,000 upfront: the \$5,800 Diagnostic, \$4,200 for process setup and control testing, and \$2,000 for training and backfill. Ongoing control effort is \$6,000 annually. Its \$23,700 recurring benefit implies 6.1 months of simple payback after full performance is reached.

The targeted option assumes \$28,000 upfront: \$5,800 Diagnostic, \$12,000 targeted configuration or integration, \$6,200 training and backfill, and \$4,000 control testing. Its \$34,300 recurring benefit implies 9.8 months of steady-state simple payback. These implementation amounts are comparison assumptions, not supplier quotations. Costs are assumed funded without additional borrowing; otherwise use net debt reduction in the interest calculation.

If benefits begin after three months, the manual option avoids \$22,275 of first-year interest. After \$6,000 ongoing cost and \$12,000 upfront, its first-year benefit net of those cash costs is \$4,275. The targeted option avoids \$31,725, less \$8,000 ongoing and \$28,000 upfront: negative \$4,275. These cash-cost comparisons are not accounting earnings forecasts; accounting treatment of upfront costs requires separate determination.

The working-capital release is reported separately from annual profit. Applying that cash to debt is a use of the release, not another benefit. For the targeted option, recurring break-even requires about \$106,667 of release at 75% debt use and 10% interest, before recovery of the upfront cost. At 50% debt use, its net

recurring benefit falls to \$20,200 and steady-state payback extends to 16.6 months. If the cash does not reduce debt, this model supplies no interest saving.

The sensitivity table holds the targeted option’s \$28,000 upfront and \$8,000 annual support cost constant. It shows why a disappointing delay reduction changes the decision.

If only half the modeled billing improvement advances customer payment, the manual option’s annual net benefit falls to \$8,850 and simple payback becomes 16.3 months. The targeted option falls to \$13,150 and 25.6 months. If customer payment does not move, the financing benefit disappears while the control costs remain. The payment evidence determines whether faster billing has produced the cash result used in this comparison.

Residual interval	Cash release	Annual net recurring benefit	Steady-state payback
14 business days	\$240,000	\$10,000	33.6 months
11 business days	\$420,000	\$23,500	14.3 months
8.6 business days	\$564,000	\$34,300	9.8 months
17 business days	\$60,000	(\$3,500)	No positive payback

10. Begin with controlled, observable actions

At the Diagnostic readout, the sponsor selects the project team for the pilot and confirms its decision rights. Timing below runs from that decision. The responsible owner assigns calendar dates and confirms available staff.

Start by reconciling the current backlog and sorting it by the first binding hold. Clear complete records through the existing approval process, retaining the required contractual evidence and invoice checks.

For the manual pilot, choose one project team and a set of comparable customer terms. Use a shared exception view and the current systems before adding a connector. Capture the baseline before changing the work. Train the field and finance participants on the same definitions and demonstrate several clean and exception cases. Keep the existing approval path and a rollback route during the test.

Review early results for record validity and workload before judging the financial case. A small first batch can expose a broken rule; it cannot prove a stable reduction in cash requirements. Expand the measurement over complete billing and customer payment cycles. Adjust the target and business case when the evidence warrants it.

When	Owner	Action and completion evidence
First 2 working days	Controller + project manager	Reconcile backlog; assign first binding reason, value, owner and next action
First working week	Commercial lead + field supervisor	Agree customer-specific evidence and change-authorization rules; test representative jobs

When	Owner	Action and completion evidence
Only if a residual system defect is demonstrated	System owner + finance approver	Test the specific mapping or rule; regression-test valid/invalid cases; verify rollback and access
Next 2–3 working weeks	Pilot process owner	Run one-team trial; review delays, errors, disputes, workload and overrides
After sufficient payment cycles	Controller + executive sponsor	Reconcile cash and borrowing; revise economic case; decide expansion or stop

11. Measures, thresholds and ownership

Review the measures together so a shorter queue does not hide more disputes or unpaid invoices. Value-weighted delay shows the cash concentration; median and upper-tail delay show whether improvement is broad or confined to a few large jobs. Retain the original cause and subsequent holds so moving an item between categories does not appear to resolve it.

The manual pilot targets a value-weighted interval of 11.4 days from completed work to a valid invoice. Targeted integration aims for 8.6 days. Both are planning assumptions to test after reconciling the baseline. Before expanding, verify that this full interval has improved and invoice validity has remained stable. Examine the time before and after eligibility separately to see which constraint changed. Any invoice released without required authority, material privacy issue or repeated incorrect customer match pauses the affected automation until the defect is understood.

Set numerical acceptance tolerances from the baseline and the financial risk. Compare dispute and credit-note rates within similar contract groups. Where sample sizes are small, inspect every exception and state that uncertainty. A monthly average must not conceal unresolved high-value work.

The controller owns the financial reconciliation. The operating manager owns the process. The system owner maintains the rule and its test history. The sponsor resolves cross-functional decisions. The review ends with decisions, owners and dates, including any reason to abandon an option that no longer fits the evidence.

Measure	What it establishes	Owner
Completed-to-eligible interval and open value	Whether evidence/commercial holds changed	Project + commercial lead
Eligible-to-issued delay by cause/value	Whether the internal constraint changed	Process owner
Evidence complete on first pass	Whether upstream capture works	Field/project lead
Invoice acceptance, disputes and credits	Whether speed preserved validity	Finance approver
Unresolved changes: value, age, authority	Commercial exposure requiring a decision	Commercial lead

Measure	What it establishes	Owner
Review hours, rework and overtime	Real workload and any expenditure avoided	Operations + finance
Affected invoice payment and net borrowing	Cash realization and interest consequence	Controller

12. The next decision and the report's evidence trail

The recommended first decision is a manual evidence and commercial-coordination pilot. Its lower initial commitment is supported by the comparison, while the event analysis identifies the conditions that a later technical investment must change. Targeted integration becomes attractive only if the further delay reduction and ongoing cost are credible. The broad-platform option needs benefits beyond this billing problem to justify its modeled cost.

The accompanying calculation files make the report inspectable. `synthetic_jobs.csv` contains the 60 input records; `synthetic_events.csv` contains their 420 events. `counterfactual_jobs.csv` carries the seven scenarios at job level. `alternative_comparison.csv`, `collection_sensitivity.csv` and `first_year_cash_schedule.csv` show the operating and financial consequences. `assumptions.json` records the inputs; `model.py` reproduces the calculations using standard Python. `verify.py` checks the totals, chronology, weighted intervals and arithmetic.

The operating questions for the pilot remain: achievable evidence and authorization times, review effort and capacity, customer payment behavior, implementation cost and the ability to maintain the controls. The pilot is designed to resolve those questions before a larger commitment.

Executive Systems Diagnostic · \$5,800 · Two weeks · One recurring operating problem

[Start the Diagnostic](#)

[Book a Call](#)