SINCE 1994

Risk-based *testing.*

WHAT IT IS, WHY IT WORKS, AND A CA PILOT THAT PROVES IT · REX BLACK, INC.

You are going to test *less than 100%* of the system.

The question isn't *whether* you'll make a selection.
It's whether the selection is **deliberate or accidental.**

WHAT THIS IS ABOUT

In plain English.

For any real product, there is an **infinite cloud** of possible tests. You do not have forever. You run a finite number. Measured as a percentage of what you could test, your coverage is always zero.

Risk-based testing is how you select which tests to run — and which to cut first when the schedule compresses. This talk answers four questions:

- **How do you pick the right tests** out of an infinite cloud?
- **How do you know when you've tested enough** to ship?
- **When the schedule slips, which tests should you drop first?**
- **How do you prove to leadership** the trade-off was defensible?

Quality risk.

Prioritized tests.

Informed trade-offs.

DEFINITION

The method in one slide.

Quality risk is the possibility that the product fails to deliver one or more of its key quality attributes.

Risk-based testing:

- Uses an analysis of quality risks to **prioritize tests.**
- Uses that analysis to **allocate effort** per risk item.
- Involves **business and technical stakeholders** so what gets tested lines up with what quality means to the people who live with the product.
- Also manages **project risks** — events that endanger the project itself — alongside the quality risks.

THE FOUR BENEFITS

Find, minimize, measure, *cut.*

BENEFIT 1 OF 4

Find the scary stuff *first.*

Running tests in risk order finds defects in **severity order.**

The first bug you find is the bug that matters most. Every fix window you open gets used on the highest-impact defect in the system.

BENEFIT 2 OF 4

Minimize residual risk *at release.*

Allocating effort by risk concentrates testing where the stakes are highest.

The residual quality risk at the moment of release is **lower than any other allocation** you could have chosen with the same test budget.

BENEFIT 3 OF 4

Know the residual risk *during execution.*

Measuring by risk tells you where you stand in real time.

You can answer **"is this ready?"** with evidence instead of opinion. Release when the risk of delay balances the risk of dissatisfaction.

BENEFIT 4 OF 4

Cut in *reverse risk order.*

When the schedule compresses, drop tests you worry about **least** — not tests you happen to have left on the pile.

The same time back, at the **lowest possible increase** in residual risk.

A COMMON OBJECTION

"Doesn't this *increase test work?*"

OBJECTION ANSWERED

No. *Decreased long-run effort.*

Risk-based testing drives more **efficient** testing overall.

After the initial quality risk analysis, only periodic updates and traceability maintenance are required. Every subsequent release rides on the same analysis — refined, not rebuilt.

CASE STUDY

CA pilot.

Six activities.

92 risk items.

THE PILOT AT A GLANCE

Six activities.

1. **Train** the stakeholders.
2. Hold the **quality risk analysis session.**
3. **Analyze and refine** the results.
4. **Align testing** with the risks.
5. **Guide the project** by risk.
6. **Assess** the benefits.

Published in *Better Software*. Followed by two additional pilots at the same client.

ACTIVITY 1 · TRAINING

One day. Worked exercise.

Not lecture. **Presentation, discussion, and a worked exercise.**

Covers: the principles; the categories of quality risks; how to analyze them; how to align testing with risk levels; how to document the analysis; how to monitor risks during execution; how to report risk-based results.

ACTIVITY 2 · ANALYSIS SESSION

Two sub-sessions.

IDENTIFY

Three whiteboards for the main quality-risk categories. Sticky notes under the relevant one. Three hours. **Over 100 risk items** — plus 11 project risks and 3 other issues.

RATE

Likelihood + impact per item. Duplicates identified and merged. **40% rated in-session**; test manager finalized the rest with participants afterward. Ended with **92 risk items** on the docket.

The *RPN* histogram.

Risk Priority Number = Likelihood × Impact. 1 (most risky) to 25 (least risky) on a 5×5 scale.

Common problem: clumping. Shows up when the team skews impact toward worst-case, or when the scale has poorly defined distinctions.

Check: plot the histogram. **Fix:** refine the scale, re-rate.

ACTIVITY 3 · CLUMPING IN REAL DATA

The CA histogram.

LIKELIHOOD (REASONABLE)

1 · 5 · 9 · 25 · 39 · 26

Skewed toward high end. Actual: mature product, stable codebase, experienced dev. The distribution reflected reality. **No adjustment.**

IMPACT (CLUMPED — FIX)

1 · 10 · **52** · 32 · 8 · 2

Over half the items at rating 2. Flattened the RPNs. **Redraw the line between impact 2 and 3.** Re-rate. Plot again.

ACTIVITY 4 · ALIGNMENT

Allocation of *test effort* by RPN.

RPN 1–12 · EXTENSIVE

Large number of tests. Broad and deep. Combinations and variations. **Bulk of test attention.**

RPN 13–16 · BROAD

Medium number of tests across many interesting conditions. Fewer combinations; still wide coverage.

RPN 17–20 · CURSORY

Small number of tests sampling the most interesting conditions. Enough for obvious regressions.

RPN 21–25 · OPPORTUNITY

Leverage other tests to run one or two of these — **only if** investment is small and opportunity presents itself. Otherwise *skip it.*

Priority beats *expertise assignment.*

Previously: tests assigned by tester expertise. **Bottleneck every time a key person was out.**

Under risk-based testing: priority by RPN. Bottlenecks went away. High-priority tests ran early. Low-priority tests ran later.

Bug management also changed. Severity augmented with risk prioritization. Fix-time focused on the high-risk defects.

ACTIVITY 6 · BENEFITS

What the pilot *delivered*.

- **Intelligent effort allocation** within the constraints the project actually had.
- **Priority-order bug discovery** that optimized every fix-time window.
- **Flexible handling** of reductions in time or resources.
- **Optimized quality** within the constraints, not in spite of them.

Select *deliberately.*

Cut honestly.

On the method.

- **Coverage is always zero.** The honest question is how you select.
- **Four benefits, not one.** Find severity-first. Minimize residual risk. Know real-time risk. Cut in reverse order.
- **Run analysis as a workshop.** Whiteboards, sticky notes, business + technical + test.

On running it.

- **Plot the RPN histogram.** If it clumps, the scale is wrong — not the product.
- **Map risks to specs and tests.** Traceability cuts both ways.
- **Priority beats expertise assignment** — routes around every bottleneck.

> *Release when the risk of delay balances the risk of dissatisfaction.*

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Thank you.

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