The Automation Illusion

Why Cyber Risk Still Requires Human Judgment

by Mark Kirkendall

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Phone: (209) 214-9541
Email: contact@perceptivecyber.com
Website: www.perceptivecyber.com
Address: PO Box 361, Vallecito, CA 95251

Executive Summary

Automated cybersecurity tools have become foundational to modern security programs. Vulnerability scanners, endpoint detection and response (EDR/XDR) platforms, configuration management tools, and compliance scanners provide organizations with critical visibility into their environments. They enable efficient data collection, help identify control gaps, and support ongoing monitoring at a scale that would be difficult to achieve manually.

In parallel, a growing number of platforms now aim to extend automation beyond data collection—aggregating findings, measuring compliance, and generating risk scores or prioritized assessments based on automated analysis.

These capabilities are valuable—but they are not sufficient.

It is important to distinguish between tools that collect and validate security data and those that attempt to interpret that data as organizational risk. The former play a critical role in identifying issues and informing assessments. The latter provide useful inputs, but their outputs are inherently limited by the scope, assumptions, and data available to the systems producing them.

Automation can measure what is visible and defined; it cannot fully account for what is missing, misunderstood, or contextually significant.

Risk is not determined solely by the presence of vulnerabilities or control gaps. It is shaped by factors such as asset criticality, control maturity, exposure, business impact, and environmental nuance—elements that require interpretation, validation, and judgment. These are not qualities that can be fully captured through automated analysis alone.

This paper argues that while automated tools—including those that assist in measuring compliance and summarizing risk—play a critical role in supporting cybersecurity assessments, they cannot replace human analysis in determining real organizational risk. Effective risk assessments require a combination of structured frameworks, reliable data collection, and informed human evaluation to ensure that findings accurately reflect the organization's true risk posture.

The goal is not to produce a report that appears complete or precise, but to understand and reduce actual risk. Achieving that outcome requires moving beyond automation alone and applying deliberate, context-driven judgment to the assessment process.

The Rise of Automated Risk Tools

As cybersecurity programs have matured, so has the reliance on automation. The scale and complexity of modern IT environments can make manual assessment tedious and time consuming. Organizations now depend on a wide range of tools to monitor systems, identify vulnerabilities, and validate the implementation of security controls.

Vulnerability scanners identify known weaknesses across networks and systems. Endpoint detection and response (EDR/XDR) platforms provide visibility into device activity and potential threats. Configuration and compliance tools evaluate systems against established baselines and frameworks. These technologies have become indispensable, enabling organizations to collect and process large volumes of security data efficiently and consistently.

In parallel, many platforms have evolved to extend beyond data collection. They now aggregate findings across multiple tools, measure alignment with frameworks, and generate dashboards, risk scores, and prioritized outputs intended to represent an organization's overall risk posture. Security leaders are increasingly presented with automated assessments that aim to summarize risk in a clear and actionable way.

This evolution is understandable. Organizations need practical ways to interpret growing volumes of information, communicate risk to leadership, and prioritize remediation efforts. Automation offers speed, consistency, and the appearance of objectivity—qualities that are especially valuable in environments with limited resources and competing priorities.

However, this shift introduces a subtle but important change in how risk is perceived.

Data collection and validation tools are designed to identify and report on specific conditions: missing patches, insecure configurations, anomalous activity, or gaps in control implementation. Automated assessment platforms attempt to go a step further—interpreting those conditions, measuring compliance, and assigning relative importance through scoring or ranking models.

In doing so, they move from answering what is happening to implying what matters most.

That transition—from observation to interpretation—is where limitations begin to emerge.

Where Automation Reaches Its Limits

As automated platforms evolve from data collection to interpretation, their limitations become more pronounced.

Automated tools operate within defined boundaries. They assess what they are configured to assess, based on available data, known conditions, and predetermined logic. Within those parameters, they can be highly effective. They identify vulnerabilities, validate configurations, and surface patterns that would be difficult to detect manually.

However, those same boundaries define their limitations.

Automation does not recognize when its visibility is incomplete. It does not question whether all relevant systems are included in scope, whether data sources are accurate, or whether controls are functioning as intended beyond what can be measured. It evaluates what it can see and assumes that view is representative of the environment.

In practice, this assumption often breaks down.

A vulnerability scanner may report strong coverage, while certain network segments, disconnected systems, or unmanaged devices remain unassessed. An endpoint platform may show high compliance across enrolled systems, while other devices—whether unmanaged, misconfigured, or simply not reporting—fall outside its visibility. A mobile device management solution may reflect policy enforcement on managed devices, without accounting for those that are not enrolled.

In each case, the tool is not incorrect—it is incomplete.

Automation also lacks the ability to interpret context. It cannot distinguish between a control that exists in a limited or inconsistent form and one that is fully operational across the organization. It does not evaluate how controls interact, whether compensating measures exist, or how a particular weakness aligns with real-world exposure and threat activity.

Risk is shaped not only by what is present, but by how well it is implemented, where it is applied, and what surrounds it. These are contextual factors that require interpretation.

There is also a broader category of risk that falls outside the scope of most automated tools entirely. Informal processes, undocumented exceptions, legacy systems, and gaps in operational practice often introduce meaningful risk but remain invisible to automated analysis. These are not edge cases—they are common characteristics of real-world environments.

As a result, automated outputs often reflect a structured view of known data rather than a complete understanding of organizational risk.

Automation answers the question: What can be measured?

Risk assessment requires answering: What actually matters?

The Cost of Misplaced Confidence

The limitations of automation are not simply technical—they have practical consequences. When automated outputs are treated as complete representations of risk, organizations can develop a false sense of security.

Automated risk scores and prioritized findings often appear precise and objective. They are derived from structured data, calculated using consistent logic, and presented in clear formats that are easy to communicate to leadership. This creates confidence in the results, even when the underlying inputs are incomplete or lack context.

The issue is not that the data is wrong. The issue is that it is interpreted as complete.

When this happens, organizations may direct time and resources toward areas that are visible and measurable, while overlooking risks that fall outside the scope of automation. Effort is spent improving controls that are already reasonably mature, while less visible weaknesses—often with greater real-world impact—remain unaddressed.

This misalignment can lead to several outcomes:

- Security investments that do not meaningfully reduce risk
- Gaps in coverage that persist despite “strong” assessment results
- Overconfidence in control effectiveness
- Difficulty explaining or defending decisions when incidents occur

Over time, this erodes the effectiveness of the security program. Decisions become driven by what is reported rather than what is actually happening. Metrics improve, but risk may not.

This dynamic is particularly challenging for organizations with limited resources. When time, staffing, and budget are constrained, prioritization matters. Addressing the wrong issues first is not just inefficient—it can leave the organization exposed in critical areas.

At its core, the purpose of a risk assessment is not to produce a report that appears complete or well-structured. It is to accurately identify where the organization is most vulnerable and to guide meaningful risk reduction.

When automation is relied upon without validation and interpretation, that goal becomes harder to achieve.

The Role of Human Judgment in Risk Assessment

If automated tools provide visibility, human analysis provides understanding.

Effective risk assessment requires more than identifying control gaps or aggregating findings. It requires evaluating those findings within the context of the organization—its environment, its operations, and its real-world exposure to threats. This is where human judgment becomes essential.

Human analysis brings the ability to validate what automated tools report and, just as importantly, to recognize what they do not. It allows practitioners to question coverage, identify blind spots, and account for inconsistencies that fall outside structured data collection. It also enables a deeper evaluation of control effectiveness—distinguishing between controls that exist in name and those that function as intended across the organization.

Context is central to this process.

Two organizations may present similar findings in an automated report, yet face very different levels of risk. The difference may lie in how critical certain systems are, how exposed they are to external threats, how consistently controls are applied, or what compensating measures exist. These are not variables that can be fully evaluated through automated logic alone.

Human judgment also plays a critical role in interpreting maturity, likelihood, and impact—factors that are foundational to meaningful risk prioritization. As discussed previously, risk is not defined solely by the presence of a gap, but by how that gap interacts with the broader environment.

This process is not purely analytical—it is also iterative and educational. Conducting a thoughtful assessment requires engaging with systems, processes, and stakeholders across the organization. In doing so, it builds a deeper understanding of how the environment actually operates, where weaknesses exist, and how improvements can be implemented effectively.

That understanding is itself a valuable outcome.

Automated tools can surface data, but they do not learn. Organizations do.

By incorporating human judgment into the assessment process, organizations move beyond static reporting and toward a more accurate, informed, and actionable understanding of their risk posture.

A Balanced Approach: Automation Informed, Human Driven

The objective is not to reduce the role of automation, but to place it in the right context.

Effective cybersecurity assessments rely on a combination of automated data collection and human evaluation. Each plays a distinct role. Automated tools provide scale, consistency, and visibility across systems and environments. Human analysis provides interpretation, validation, and contextual understanding.

When used together, they form a complementary model.

In this approach, automated tools are used to gather and validate information—identifying vulnerabilities, monitoring activity, and assessing control implementation. This data serves as an input into the assessment process, not the final output. Human practitioners then evaluate that information alongside additional context, including control criticality, maturity, exposure, and business impact.

Structured frameworks such as the NIST Cybersecurity Framework and the CIS Critical Security Controls provide the foundation for this process. They define what safeguards should exist and offer a consistent structure for evaluation. However, as discussed previously, frameworks alone do not determine priority. That requires interpretation.

By combining framework-based assessments with data from automated tools and informed human judgment, organizations can move toward a more accurate representation of risk. This aligns directly with the concept of evaluating maturity, likelihood, impact, and criticality to drive meaningful prioritization, rather than relying solely on severity or compliance status.

This balanced model also improves consistency and defensibility. Decisions are not based on isolated findings or opaque scoring algorithms, but on a structured process that can be explained, validated, and refined over time. It enables organizations to justify priorities to leadership, demonstrate due diligence, and ensure that remediation efforts are aligned with real-world risk.

Most importantly, it keeps decision-making where it belongs—with experienced practitioners who understand both the data and the environment it represents.

Automation strengthens the assessment process. It does not replace it.

Conclusion

Automation has transformed cybersecurity operations. It enables organizations to collect, process, and monitor security data at a scale that would not otherwise be possible. Without it, maintaining even a baseline level of visibility across modern environments would be difficult.

But visibility is not the same as understanding.

The increasing reliance on automated tools to generate risk scores and assessment outputs has created a subtle but important shift. In many cases, data collection has become conflated with risk evaluation. Reports appear complete, metrics appear precise, and scores appear objective—but they remain constrained by the scope and assumptions of the tools that produce them.

Risk cannot be fully understood through automation alone.

It requires context. It requires validation. It requires the ability to question what is seen—and what is not. These are functions of human judgment, informed by experience and grounded in an understanding of how systems, controls, and business operations interact in the real world.

Organizations that rely solely on automated outputs risk prioritizing the wrong issues, overlooking critical gaps, and developing a false sense of security. Those that incorporate human analysis into the assessment process are better positioned to identify meaningful risk, allocate resources effectively, and improve their overall security posture.

The path forward is not to reduce the use of automation, but to use it deliberately.

Automated tools should be leveraged to collect and validate data, support ongoing monitoring, and inform the assessment process. Human practitioners should interpret that data, apply context, and make informed decisions about risk and priority.

Cyber risk is not a dataset to be processed—it is a condition to be understood.

Achieving that understanding requires more than automation. It requires deliberate, informed, and human-centered analysis.

About the Author

Mark Kirkendall is an IT Security Manager for a county government with over 25 years of experience in information technology, including more than 14 years focused on cybersecurity and local government environments. He holds a Master's degree in Cybersecurity from California State University San Marcos.

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