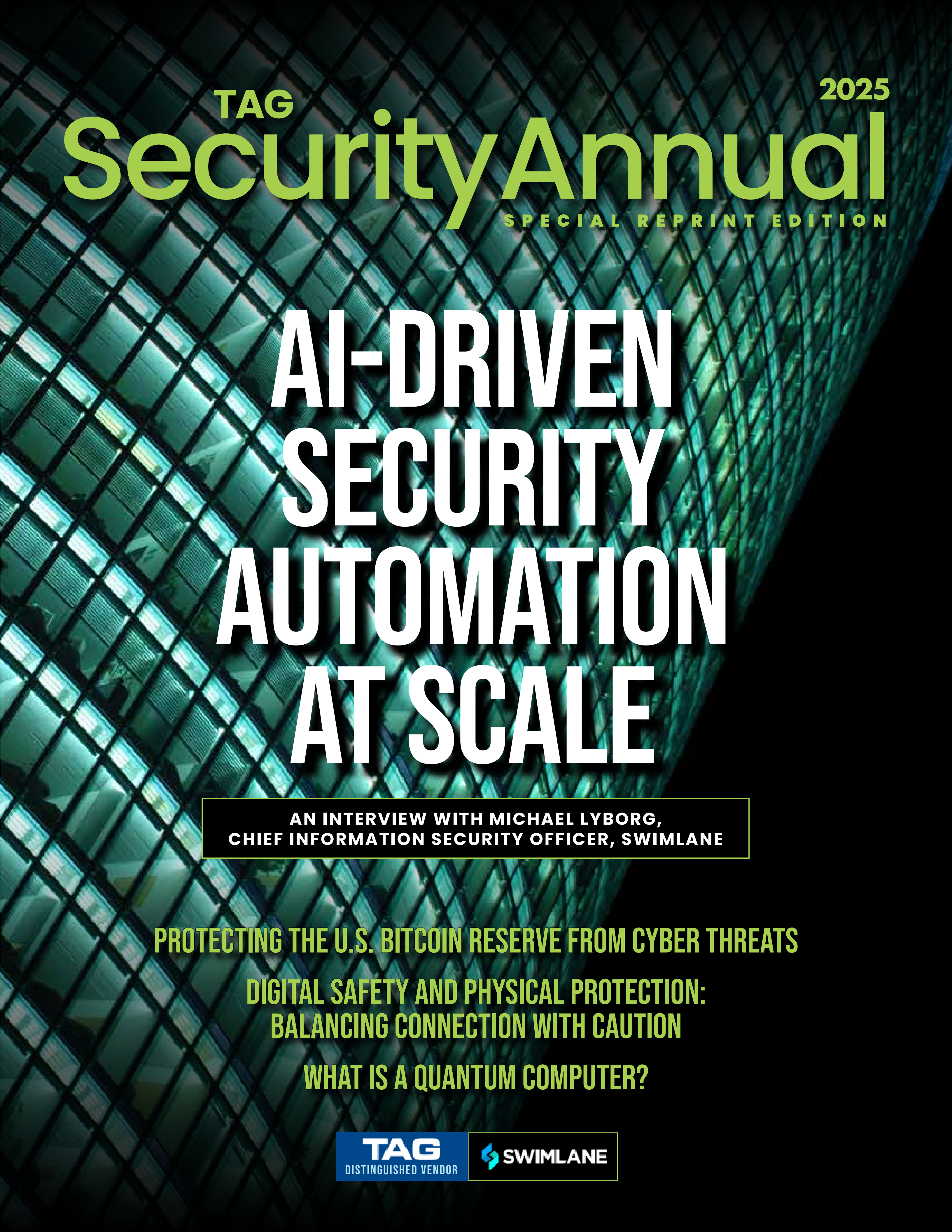

TAG

Security Annual

2025

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AI-DRIVEN SECURITY AUTOMATION AT SCALE

AN INTERVIEW WITH MICHAEL LYBORG,
CHIEF INFORMATION SECURITY OFFICER, SWIMLANE

PROTECTING THE U.S. BITCOIN RESERVE FROM CYBER THREATS

DIGITAL SAFETY AND PHYSICAL PROTECTION: BALANCING CONNECTION WITH CAUTION

WHAT IS A QUANTUM COMPUTER?

TAG DISTINGUISHED VENDOR

SWIMLANE

The need to reduce cyber risk has never been greater, and Swimlane has demonstrated excellence in this regard. The TAG analysts have selected Swimlane Inc. as a 2025 Distinguished Vendor, and such an award is based on merit. Enterprise teams using Swimlane's platform will experience world-class risk reduction—and nothing is more important in enterprise security today.

The Editors,
TAG Security Annual
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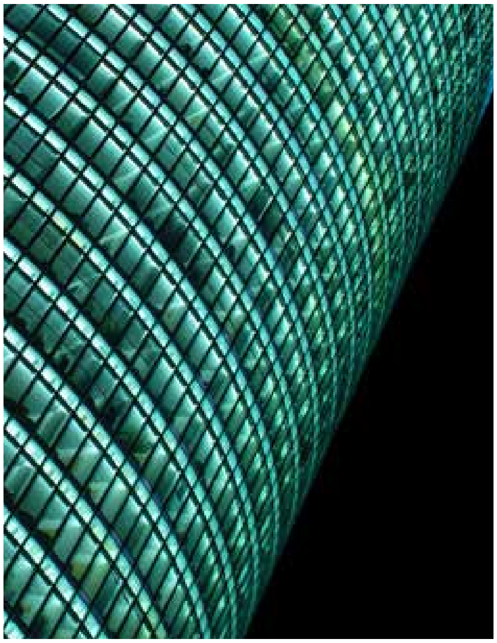
AN INTERVIEW WITH MICHAEL LYBORG, CHIEF INFORMATION SECURITY OFFICER, SWIMLANE

AI-DRIVEN SECURITY AUTOMATION AT SCALE

Security teams today are overwhelmed by alert volume, tool sprawl, and evolving threats. Swimlane's Turbine platform meets this challenge head-on by combining low-code automation with advanced AI to streamline detection, accelerate response, and elevate analyst performance. Whether enriching alerts, automating playbooks, or contextualizing large datasets, Swimlane helps SOC teams operate at scale—while reducing MTTR, false positives, and operational overhead. In a recent interview with Swimlane, we learned how the company empowers security teams across industries with intelligent automation by design and accessible by default.



TAG: How does Swimlane's Turbine platform leverage AI-enhanced security automation to improve threat detection and response times for organizations?

SWIMLANE: The combination of AI and automation at cloud scale is a unique feature of Swimlane, supporting detection and response times in various ways. With Swimlane, newer SOC analysts can operate at the skill level of someone with many more years of experience, thanks to capabilities such as AI assistants, recommended actions, case summarizations, and low-code playbook building, which provide them with the necessary tools to operate at a higher level. Even more experienced team members are up-leveled by AI because it helps analysts contextualize large data sets and find the needle in the haystack.

Every organization is unique in terms of outcomes and performance indicators for threat detection and response, but to give you an idea, here are some KPIs that customers commonly track that Swimlane Turbine helps improve: percentage of automatically created cases, alert false positive rate, average MTTR and MTTD, percentage of alerts enriched, percentage of alerts mapped to ATT&CK, percentage of actionable alerts automated, and case reduction rate.

TAG: Can you elaborate on the role of Hero AI within Swimlane's Turbine platform and how it assists security operations teams in managing complex security workflows?

SWIMLANE: Hero AI is a generative and agentic AI capability set within the Turbine platform. There are many ways to use AI and automation together, but here are a few of my favorites. Hero AI's text-to-code feature gives us an efficient way to build Python code. We can validate that there are no exceptions and use input variables to test the script within the AI interface. The Hero AI HelpDocs ChatBot is nothing flashy, but my team uses it often. It offers an easy way to understand the specifics of the UI without having to stop what I'm doing and read documentation.

Hero, the agentic AI companion, is particularly effective in helping us summarize large datasets. Last but not least, my favorite way to use Hero is to help create reports for our leadership team and board. Hero AI is great at summarizing key risk and performance indicators in human sentences that non-technical stakeholders can easily understand.

For smart contract security and AI-assisted code auditing, Swimlane integrates with AI-based static and dynamic analysis tools to detect vulnerabilities before deployment.

TAG: With the increasing complexity of security infrastructures, how does Swimlane ensure seamless integration with existing security tools and platforms?

SWIMLANE: Remaining ecosystem-agnostic through integrating with any API is one of Swimlane's key strengths. Swimlane Marketplace has a vast library of out-of-the-box connectors and components that can be downloaded from Turbine's in-app content library. In recent years, we've focused significant development on reducing the expertise required to build integrations or playbooks. Turbine Canvas, our low-code playbook-building studio, also supports the use of webhooks and remote agents to pull in telemetry from datasets that are harder to reach, enabling seamless automation in any environment.

TAG: In the context of financial services, what specific benefits does Swimlane's security automation provide to address the unique challenges this industry faces?

SWIMLANE: When speaking with our customers from financial institutions, they face many of the same security operations challenges as other industries; however, fraud stands out as a unique challenge that benefits from AI automation. Financial institutions will have a fraud detection and analysis tool, maybe even a dedicated team, but it's still in a silo. These tools are great at what they do, but if you treat them like an edge sensor managed by a team that doesn't have visibility into the full attack surface, then it's really hard to get the full context.

Swimlane Turbine can bridge this gap for financial institutions by bringing fraud detection and analysis data into a single view alongside enterprise IT, cloud infrastructure, and other relevant systems. This is where automation and orchestration are king, and suddenly, it becomes easy to take queries, build them out, and start automating a rudimentary threat hunt for IOCs.

TAG: As the cryptocurrency sector grows, how can Swimlane's AI-enhanced security automation help organizations protect their digital assets against emerging cyber threats?

SWIMLANE: As the crypto ecosystem evolves—bringing dApps, smart contracts, cross-chain bridges, and dynamic tokenomics—so do the threats. From Sybil attacks to sanctioned address exploits, adversaries are getting faster and smarter. Swimlane's AI-powered low-code automation can defend against these risks across four domains.

For smart contract security and AI-assisted code auditing, Swimlane integrates with AI-based static and dynamic analysis tools to detect vulnerabilities before deployment. It orchestrates full-stack audits with platforms like ConsenSys Diligence and MythX, catching issues like reentrancy attacks and integer overflows. Secure vault integrations (e.g., HashiCorp Vault, AWS KMS) ensure deployment keys remain protected while automating threshold signing and multi-sig workflows.

In blockchain intelligence, sanctions screening, and wallet monitoring, Swimlane tracks wallet transactions in real-time. If a wallet is sanctioned (e.g., per OFAC), blacklisted, or flagged in phishing campaigns, automated playbooks can freeze assets, alert compliance, or file SARs. It vets addresses during airdrops, DAO withdrawals, and bounty payouts to block sanctioned parties like the Lazarus group. Swimlane's AI also profiles wallets to detect anomalies in transaction frequency or gas use—flagging compromise or Sybil activity.

To counter Sybil attacks and airdrop fraud, Swimlane applies behavioral profiling to on-chain activity, wallet histories, and transaction graphs—distinguishing real from fake users. It also combines Web 3 activity with Web 2 identifiers (email, GitHub, Twitter) to automatically calculate trust scores, automatically flagging or rejecting low-trust applicants.

For incident response in Web3 infrastructure, Swimlane ingests contract-level logs from tools like Forta and Tenderly to detect unusual governance changes or withdrawals. Automated playbooks can freeze multi-sigs, revoke privileges, and alert security. It also monitors validator nodes, oracles, bridges, and RPC endpoints—triggering workflows for risks like slashing, downtime, or manipulation.

PROTECTING THE U.S. BITCOIN RESERVE FROM CYBER THREATS

DR. EDWARD AMOROSO, SENIOR ANALYST, TAG

As you no doubt have heard, plans are in place to establish a Strategic Bitcoin Reserve and Digital Asset Stockpile, with the goal to position the U.S. as a leader in cryptocurrency. The reserve will presumably be funded with Bitcoin seized in criminal or civil asset forfeiture proceedings, ensuring no additional cost to taxpayers.

This overall initiative seeks to capitalize on Bitcoin's fixed supply and its potential as a unique store of value in the global financial system. An **executive order** dictated that as part of this initiative, federal agencies must provide a comprehensive accounting of their digital asset holdings to ensure proper oversight.

In addition to the Bitcoin reserve, the order established a stockpile to manage other digital assets obtained through forfeiture. The administration emphasizes that this move is part of a broader strategy to harness the power of digital assets for national prosperity. **David Sacks**, appointed as the White House's AI and crypto czar, likened the reserve to a "Digital Fort Knox."

This development marks a shift in U.S. policy, reflecting a recognition of the importance of cryptocurrencies and digital assets in our economy. Securing this stockpile and reserve, however, will require addressing security issues across multiple layers of infrastructure. This brief analysis presents our view first of the threats this development introduces, and then possible defenses that might help mitigate those threats.

SECURITY THREATS TO U.S. CRYPTO RESERVE

It is reasonable, before we propose our security plan, to first pore through the threats relevant to this new Bitcoin reserve. The bottom line regarding security is uncomfortable, but here it is: If hackers, criminals, or nation-states find a way to compromise or steal our national stockpile of crypto, it will be gone. Period. End of story.

Some readers might protest, suggesting that surely there would be a centralized means for establishing control, but the whole point of crypto is to avoid such control. Crypto is based on a decentralized peer-to-peer system that evades traditional oversight. With Bitcoin, you swap the security of regulatory oversight with the security of the software that holds your coins.

Let's tick through nine specific threats that should worry any practitioner tasked with tending to security for this stockpile. We should also remember: When you have any type of stockpile, you are just *screaming* to adversaries that you've placed a large number of eggs, so to speak, into one basket. Our reserve will be a target for every crypto hacker on the planet.

One more thing: We do not have decades of experience protecting crypto, so this is all new ground for most security teams. We can therefore be 100% certain that security errors, misconfigurations, and oversights will occur. I should say this again: Since this is a new area of security, we will see protection mistakes made—for sure.

THREAT 1: KEYS.

Let's begin with cryptographic keys. Our national stockpile will be protected by various public and private key pairs, which assumes that we would distribute the stockpile across accounts. Lose the private key for any wallet with crypto, and you are breached. Private key compromise through hacking, insider threats, or physical attacks is thus a major threat.

THREAT 2: HANDLING

The crypto in the stockpile will presumably be used for different purposes, including payments, withdrawals, and other operations. The problem is that any bugs or exploitable vulnerabilities in the smart contracts that govern these fund withdrawals and spending could lead to security issues—and again, this is not something that can be adjudicated in court.

THREAT 3: EXCHANGES

If reserves are held in or moved through crypto exchanges, which seems likely, then they become big targets for hacking and insider threats. Recognize that exchanges are built from software, including open-source, and they are thus prone to insider attacks, malware, and other types of exploits that we see so often across various industries.

THREAT 4: NATION STATES

State-sponsored hacking groups using zero-day exploits, social engineering, or supply chain attacks will most definitely use whatever means available to steal from our reserve. This is likely to include novel zero-day (0-Day) vulnerabilities discovered by elite offensive actors in countries such as Russia and China.

THREAT 5: INSIDERS

Rogue U.S. government employees or contractors, or ones who are vulnerable to coercion tactics (e.g., blackmail, bribery, extortion), will be major security challenges for the management of our stockpile. People will be required to manage this asset, and if a sufficient number go bad or collude, then we will lose our money.

THREAT 6: TRANSACTIONS

Attackers intercepting transactions or exploiting network vulnerabilities can create havoc for our national stockpile, and I am not sure that sufficient controls would be in place even to detect in real-time that this is happening. This is an area that demands more government-funded research, especially if we are going to stockpile crypto.

THREAT 7: MALWARE

Malware introduced via compromised software, firmware, or hardware is an obvious threat. In fact, this is one that perhaps resonates most clearly with practitioners. The supply chain for the systems, wallets, and other tools that will be used to manage and trade crypto will be tough to easily characterize (e.g. using a SBOM or similar).

THREAT 8: QUANTUM

Future advances in quantum computing breaking existing cryptographic security are an obvious concern. Remember that we are relying on public key cryptography to protect this pile of money. If some nation-state has quantum machines in their intelligence basement doing cryptanalysis, then they can break the anonymity of transactions.

THREAT 9: EXTORTION

Criminal groups targeting individuals with access to keys via ransomware or coercion will be a threat vector we can expect. That is, when someone gains access to one of our systems, we should expect that they will not only steal our currency but will probably also assign some sort of additional ransom or extortion demand.

PROPOSED NATIONAL PLAN TO PROTECT THE CRYPTO RESERVE

The list of threats outlined above should come as no surprise to anyone (like me) who has been tasked with protecting national infrastructure and resources at scale. Thus, I feel obliged and reasonably well-positioned to propose a series of protection strategies that our government had better engage before we see our stockpile disappear like smoke.

My approach is to describe controls that line up roughly with the vulnerabilities listed above. I will admit that this is a richer topic than I've been able to apportion time to review, so I'm 100% certain that I'm leaving some things out. But I hope whoever will be doing this work (and I have no idea who that will be) will benefit from this first pass.

CONTROL 1: CUSTODIAL AND WALLET SECURITY

A process must be put in place to ensure that the team engaged with protecting our stockpile is using multi-signature wallets that require multiple trusted parties to approve transactions. I know this sounds obvious, but it must be reinforced. I'd also recommend using hardware security modules (HSMs), air-gapped cold storage, and regular rotation and refresh of keys.

CONTROL 2: SMART CONTRACT AND PROTOCOL VULNERABILITIES

We should conduct regular security audits with third-party security firms to ensure avoidance of weaknesses in smart contract and other protocols. The money amounts will be large enough to perhaps even use formal verification methods to validate contract integrity. The goal should be time-locked transactions to delay withdrawals and enable security responses.

CONTROL 3: EXCHANGE AND TRADING SECURITY

I think it would be wise to leverage non-custodial storage to minimize reliance on exchanges. Whoever is in charge should employ whitelisted withdrawal addresses for fund movement. And, as with pretty much all of these controls, there should be continuous monitoring and review of exchange security posture.

CONTROL 4: NATION-STATE CYBER THREATS

I worry about nation-states, because it is naïve not to expect Russia, North Korea, and China to set their sights on this stockpile. Sadly, we might see Canada, Mexico, and (ahem) Greenland come after us as well. To that end, we'd better maintain separate and redundant security layers to minimize the threat (e.g., redundant cold storage).

CONTROL 5: INSIDER THREATS AND PHYSICAL SECURITY

This is a tough one, because compromised insiders are difficult to spot. Obviously, we must implement role-based access control (RBAC) and need-to-know access. I'd suggest use of multi-person authorization for transactions and key management. I guess we should also conduct background checks for personnel with access (even though DOGE has broken this habit).

CONTROL 6: INFRASTRUCTURE AND NETWORK SECURITY

This one involves the infrastructure. Someone should be ensuring that we are using private, permissioned blockchain nodes to manage the reserve. This should involve use of end-to-end encryption for blockchain transaction communications. All the usual network security measures should also apply (e.g., regular patching and hardening of Internet-facing systems).

CONTROL 7: SUPPLY CHAIN ATTACKS

The use of commercial vendors will be required (hint: preference will be given to U.S. firms), and I guess security assessments and audits should be used to reduce risk. I'd also recommend maintaining offline backups and forensic tools to detect tampering. As you would expect, we will also need to regularly refresh and verify wallet integrity.

CONTROL 8: QUANTUM COMPUTING THREATS

I know NIST is predicting several years of safety, but I suspect that nation-states are farther along in their use of quantum computers to cryptanalyze ciphertext than we think. To that end, we should transition to post-quantum cryptography (PQC) as it becomes available, perhaps using hybrid cryptographic approaches to ensure long-term resilience.

CONTROL 9: RANSOMWARE AND EXTORTION

I don't have a great solution here, but maybe by deploying air-gapped, geo-distributed cold storage we can avoid extortion. I think we can also implement self-destruct mechanisms for wallets under duress conditions, but I'm not sure how that would work. I would also train security personnel (whoever they are) on anti-extortion protocols.

CLOSING REMARKS

I have tried to identify likely hacking threats to the U.S. stockpile and reserve, and I hope my security plan helps the right person or group build a good defense. My fear is that this will not happen—and we will build the reserve with little security oversight. If this happens, then my prediction is that the balance will be hacked, and we'll be left with an empty U.S. wallet.

DIGITAL SAFETY AND PHYSICAL PROTECTION: BALANCING CONNECTION WITH CAUTION

DAVID NEUMAN, SENIOR ANALYST, TAG

The shocking murder of Brian Thompson, the CEO of UnitedHealthcare, has heightened awareness about the importance of physical protection, particularly for high-profile individuals. This tragedy offers an opportunity to consider how physical safety and digital awareness intersect. Our digital personas, shaped by the information we share online, from professional milestones to personal routines, are increasingly part of the safety equation.

Many questions remain about what happened in early December that allowed a shooter to wait unobserved along the precise path the CEO would walk on the way to a shareholder meeting he would never address. What we do know suggests that far from a random act of violence, the killer knew in advance where and when Thompson would arrive at the location where he was shot.

We know that Thompson's wife told NBC that her husband had received threats. This revelation prompts important considerations: Were these threats received digitally? And if so, did they alter his risk profile or security measures? Understanding the nature and delivery of these threats could reveal whether his digital presence played a role in his tragic death.

Additionally, the timing and location of the attack suggest that the assailant obtained detailed information about Thompson's plans and plotted his actions based on what he'd learned. The attacker was observed arriving outside the hotel just 10 minutes before Thompson, over 90 minutes before the scheduled start of the shareholder meeting. How did the assailant know that Thompson was not staying in the hotel where the meeting would be held, and how did he know precisely when the CEO would arrive?

These details underscore the necessity of evaluating physical and digital vulnerabilities when guarding the safety of high-profile individuals and all employees. The interconnected nature of today's world demands a comprehensive approach to personal protection, considering how those with malicious intent could exploit digital footprints and real-time information.

AN OFFLINE LIFE, AN ONLINE THREAT

It isn't only executives at large corporations who are at risk. These days, you don't even need to be digitally literate to be targeted by digital thieves. Years ago, as an executive director in EY's cybersecurity practice, I was asked to investigate a perplexing case involving a man in his 90s who had become the target of a criminal scheme. The man, a proud WWII veteran, had no online presence. He did not own a smartphone, nor did he use email or social media. Yet, criminals had identified him as a vulnerable target, calling him with a terrifying story: His grandson had been in a devastating car accident while traveling in Europe and urgently needed tens of thousands of dollars for life-saving surgery. Distraught, the man was on the verge of transferring the money when he hesitated just long enough for family members to intervene.

How did the criminals find him? The answer lay in his family's digital pride. Grandchildren had posted photos of him in his uniform, accompanied by heartfelt captions celebrating his service. They tagged their locations and shared moments of family gatherings, providing a rich tapestry of information. From those posts, the criminals pieced together enough to craft their exploit, targeting a man who, by all traditional measures, had no digital exposure.

WHEN DIGITAL NORMS BECOME A WAY OF LIFE

The information domain has fundamentally transformed the way we communicate and share. In the past, milestones, daily activities, and relationships were celebrated and shared within small, trusted circles. Today, social media platforms, professional networking sites, and even messaging apps have created a culture where sharing information about our lives feels almost compulsory—a digital norm that shapes how we present ourselves to the world.

However, corporate executives must approach these new norms with extreme caution, prioritizing their personal safety and the broader interests of their organizations. Oversharing personal details, locations, or daily activities not only increases the risk of physical harm, such as stalking or targeted violence, but it can also undermine an executive's professional credibility and the company's reputation.

For this reason, corporate governance over an executive's digital persona should not be optional. It is as critical as compliance with insider trading laws or maintaining a harassment-free workplace. Just as violations of those standards are considered serious, potentially fireable offenses, failing to adhere to governance protocols for digital behavior should carry similar weight. Establishing and enforcing clear policies for how executives manage their online presence ensures alignment with the organization's values, protects personal safety, and upholds the trust placed in leadership.

RISKS IN SHARING INFORMATION

These digital behaviors often feel harmless—positive, even. Sharing our lives online strengthens connections, celebrates achievements, and builds community. But when viewed through a risk lens, their implications become clear. The information we share can inadvertently create a roadmap for malicious actors to exploit vulnerabilities, in both the digital and physical realms.

Consider how patterns of behavior emerge from daily routines shared over time. A few social media posts about visits to the same coffee shop, gym, or lunch spot can reveal predictable movements to anyone paying attention. Real-time visibility presents another concern. Sharing updates while on vacation may seem like a great way to connect with friends, but it also announces an empty home, potentially making it a target for burglary.

Then there are personal connections. Posts about family milestones, relationships, or special moments can provide fodder for emotional manipulation or scams. This was evident in the case of the WWII veteran targeted through his grandchildren's posts, which offered enough information for criminals to craft a believable story.

Professional exposure can just as easily become a vulnerability. Announcing speaking engagements or travel plans publicly, while common in many industries, can provide opportunities for targeted attacks on individuals or events.

REEVALUATING DIGITAL NORMS THROUGH A RISK LENS

What advice can companies offer to enhance executives' own digital safety and that of their inner circles? Here are a few suggestions to help foster a culture of awareness, intentionality, and proactive decision-making.

Cultivating a Mindset of Awareness: Encourage executives and their families to understand the unique risks they face, focusing on how their digital behavior can impact safety and privacy. This mindset should guide all online actions.

Encouraging Open Dialogue: Promote continuous communication within the executive's inner circle about digital habits, privacy concerns, and the potential consequences of online actions. A collaborative approach ensures everyone feels informed and accountable.

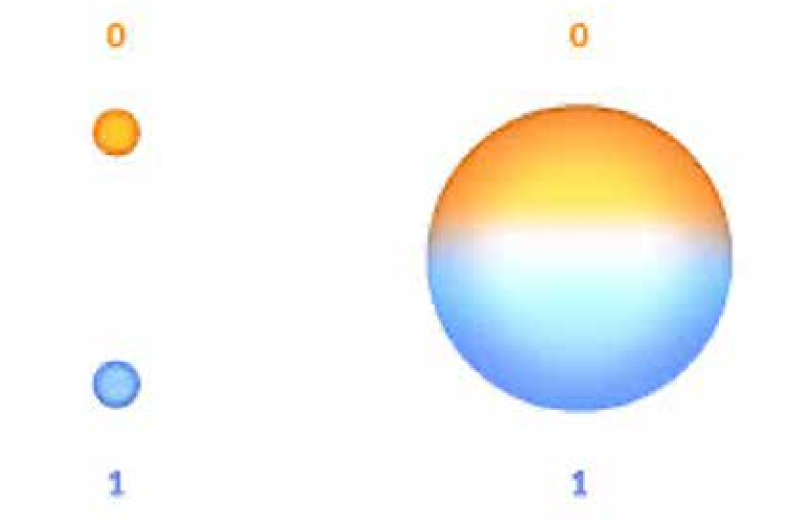
Focusing on Education: Invest in ongoing education for the executive and their family members about the evolving digital landscape, including emerging threats and safe online practices. This method avoids prescriptive tasks by building knowledge and confidence in navigating digital platforms safely.

Empowering Individual Responsibility: Instead of restrictive rules, focus on empowering family members to make informed, intentional decisions about their online behavior. This will create a sense of personal accountability and ownership.

Building Trust in External Expertise: Leverage trusted advisors or security professionals to guide safe digital practices. This external perspective helps reinforce best practices while allowing the family to focus on their priorities.

Adopting a Holistic Security Philosophy: Approach digital safety as part of a broader security and wellness framework, recognizing that physical, emotional, and digital well-being are interconnected. Encourage decisions that balance privacy with meaningful connections.

When companies offer proactive encouragement and support, executives and their families can create a sustainable and resilient approach to digital safety that aligns with their personal and professional needs. This shifts the focus from a prescriptive checklist to a thoughtful and adaptable way of engaging with the digital world.



Bit
Classical Computing

Qubit
Quantum Computing

WHAT IS A QUANTUM COMPUTER?

DR. EDWARD AMOROSO, SENIOR ANALYST, TAG

A quantum computer uses quantum bits called qubits. Unlike the binary digits in a classical computer, qubits can exist in a superposition, which means they can represent both 0 and 1 simultaneously. This property allows quantum computers to process many possibilities at once, exponentially increasing their computational power for specific problems. The following four concepts illustrate how a quantum computer can be used for computation:

1. **Superposition:** As suggested above, superposition is the ability of a qubit to be in multiple states (0 and 1) at the same time. For example, two classical bits can only be in one of four states (00, 01, 10, or 11) at a time. However, with two qubits, you can represent all four states simultaneously. This exponential scaling means that quantum computers can handle tasks such as optimization and search much faster than classical computers.

2. **Entanglement:** Entanglement is a phenomenon in quantum mechanics where qubits become strangely correlated in such a way that the state of one qubit is directly related to the state of another, regardless of the distance between them. This non-intuitive situation allows for faster transmission of information and enables quantum algorithms to perform certain computations that are infeasible for classical systems.

3. **Quantum Interference:** Quantum algorithms use something called interference to amplify correct answers and cancel out wrong answers. This approach is done in a quantum computer through operations applied to the qubits that affect their probabilities of collapsing to a particular state when measured. The cracking of conventional cryptography is enabled by quantum interference.

4. **Quantum Gates:** Similar to logic gates in classical computers, quantum gates manipulate qubits. However, quantum gates can perform operations on superpositions, allowing for much more complex transformations of data. Research teams at companies such as IBM are innovating the actual construction of systems that operate on this fundamental architectural approach to quantum computer implementation.

QUANTUM ALGORITHMS AND CRYPTOGRAPHY

Quantum computers, by leveraging the principles of subatomic quantum physics, offer a significant advantage in solving certain classes of mathematical problems more efficiently than classical computers. One area where quantum computing poses a substantial threat is cryptography, particularly with regard to the most widely used encryption algorithms today.

Shor's Algorithm: Classical cryptography relies on the difficulty of factorizing large integers (RSA—Rivest-Shamir-Adleman—algorithm) or solving discrete logarithms (ECC— Elliptic Curve Cryptography). These problems are computationally infeasible for classical computers due to the exponential time required as the key sizes increase. However, Shor's quantum algorithm can factor large integers and compute discrete logarithms in polynomial time, rendering RSA, ECC, and similar public-key cryptosystems insecure. A quantum computer with enough qubits (i.e., perhaps millions) could break these schemes, which are foundational to HTTPS, SSL/TLS, and digital signatures.

Grover's Algorithm: Symmetric key cryptography, such as AES, is more resistant to quantum attacks, but still vulnerable. Grover's algorithm allows a quantum computer to search an unsorted database more efficiently, effectively halving the security of symmetric key cryptographic systems. For instance, AES-256, which is currently considered secure, would offer only the equivalent of AES-128 security against a quantum computer using Grover's algorithm. This is still relatively secure but suggests that future encryption standards will need larger key sizes to maintain long-term security.

QUANTUM COMPUTING CHALLENGES AND CRYPTOGRAPHY'S FUTURE

While quantum computers currently face significant practical engineering challenges such as error rates, qubit coherence time, and scaling, their potential for advancing cryptographic attacks has led to the development of post-quantum cryptography (PQC). These algorithms are designed to be resistant to both classical and quantum attacks, ensuring security even as quantum technology advances.

At TAG, we believe that conventional cryptography is probably more vulnerable to the quantum threat than is normally reported, given the capability that most nation-states have with respect to both cryptography research and the construction of brute-force systems. That said, all companies should plan for a major technology and infrastructure transition to PQC sometime in the next decade.

SWIMLANE

At Swimlane, we believe the convergence of agentic AI and automation can solve the most challenging security, compliance and IT/OT operations problems. With Swimlane, enterprises and MSSPs benefit from the world's first and only hyperautomation platform for every security function. Only Swimlane gives you the scale and flexibility to build your own hyperautomation applications to unify security teams, tools and telemetry ensuring today's SecOps are always a step ahead of tomorrow's threats.

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