

Cyber Ethics and Cyber Law

CYBR-2100





HOCKING
COLLEGE

Incident Response & Evidence Notes

Week 4 - B

Incident & Evidence Notes

Outcomes: Explain the NIST lifecycle in plain language; (2) Write a 1-page Incident & Evidence Note that is complete but minimum necessary; (3) Make a risk-based containment recommendation and justify it.

Why this matters:

Security teams face legal/ethical boundaries during incidents. You'll learn to recognize common cybercrime patterns, act within authorization, and capture minimum, defensible evidence that respects privacy and due process. Our goal: help without harm—to users, to investigations, and to rights.

Ethical Lens:

Minimize harm and professional responsibility. Practice minimum necessary collection and proportional containment . Protecting individuals' privacy rights, sticking to authorization, document truthfully, preserve evidence integrity.



NIST Cybersecurity Framework (CSF)

- Preparation
- Detection/Analysis
- Containment
- Eradication
- Recovery
- Lessons Learned.



Incident Response Lifecycle

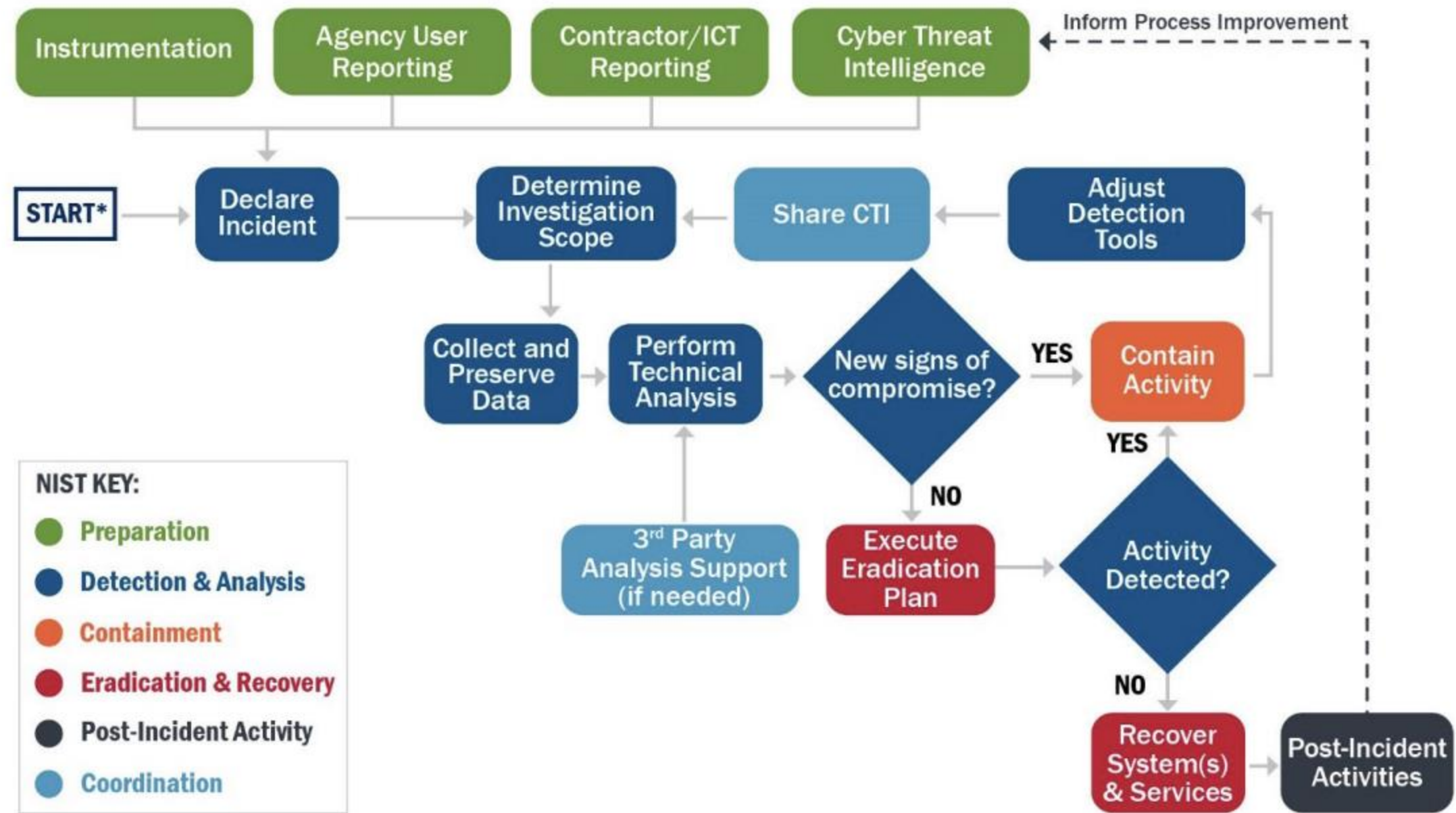


Figure 1: Incident Response Process

- https://www.cisa.gov/sites/default/files/2024-08/Federal_Government_Cybersecurity_Incident_and_Vulnerability_Response_Playbooks_508C.pdf

NIST Cybersecurity Framework (CSF) 2.0

- Govern (GV): The organization's cybersecurity risk management strategy, expectations, and policy are established, communicated, and monitored.
- Identify (ID): The organization's current cybersecurity risks are understood.
- Protect (PR): Safeguards to manage the organization's cybersecurity risks are used.
- Detect (DE): Possible cybersecurity attacks and compromises are found and analyzed.
- Respond (RS): Actions regarding a detected cybersecurity incident are taken.
- Recover (RC): Assets and operations affected by a cybersecurity incident are restored.

NIST Cybersecurity Framework (CSF) 2.0

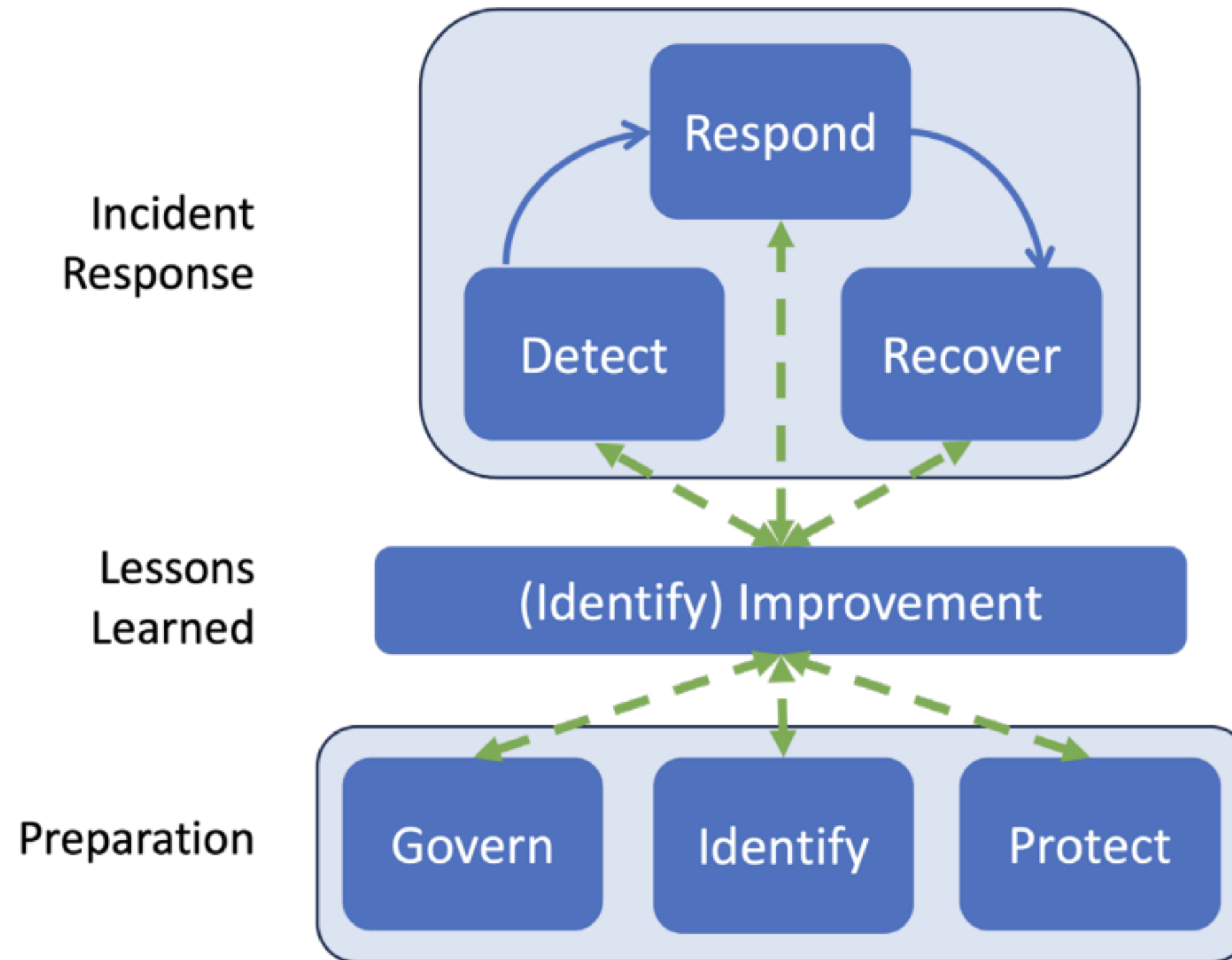


Fig. 2. Incident response life cycle model based on CSF 2.0 Functions

CSF 2.0 - Govern

- How leadership sets expectations for risk, privacy, and incident authority.
- Context and policy layer that shapes every incident decision, including notification and data handling obligations.
- It answers:
 - *Who can approve what?*
 - *What legal/privacy obligations apply?*
 - *Who gets notified?*
- It sets out the authorization, scope, and privacy constraints.

CSF 2.0 - Identify

- Know what you're defending (accounts, devices, apps) and what risks you accept.
- Maps out:
 - What systems are in scope
 - Where logs live
 - Who owns what
 - What “critical” means

CSF 2.0 - Protect

- Safeguards that lower incident frequency/impact
- Including:
 - MFA
 - Role-based access
 - Allow-listed admin tools
 - Email authentication
 - Backups
- Can reduce number of incidents, so teams can focus on higher impact events
- Controls can also slow attackers (harder lateral movement)

CSF 2.0 - Detect

- Monitoring and analysis to find anomalies and declare incidents.
- Monitoring includes:
 - Networks
 - Endpoints
 - Auth attempts
 - Email/web services
 - Service-provider activity
- Declaring an incident is part of detection
- Don't wait for certainty before declaring

CSF 2.0 - Respond

- Highlights documenting what happened, preserving integrity/provenance, and estimating magnitude
- Incident & Evidence Note is a component of this
- Covers:
 - Investigating
 - Deciding containment strategy
 - Recording actions
 - Coordinating communications.

CSF 2.0 - Recover

- Restore assets and operations, and prevent attack recurrence
- Explain clearly what you're doing and why during recovery (to leadership/users)



Roles

- Speak in roles
- Write clean handoffs to next in line
- Declarer: confirms/declares incident; opens ticket; sets initial scope.
- Coordinator/Incident Manager: assigns owners, tracks actions, escalates.
- Comms: who informs stakeholders (and what you can/can't share).
- Technical Owner(s): do the captures within authorization.
- Legal/Privacy Liaison: checks policy, retention, breach notice rules.
- Use these words in your note (owner/handoff/next step).

Incident Preparation

- Before incidents occur put in place clear policy, roles, and plans so you're ready to act fast.
- When to declare an incident
 - Adverse activity meets your incident criteria
 - Don't wait for absolute certainty
- Evidence collection and handling procedure
 - Acquire → Preserve → Document → Avoid alteration → Store promptly.
 - Follow playbook for common events, tools to use,
- Who to notify and who not to notify in the event of a computer security incident.
 - Within the company, who needs to be notified, and what information does each person need to have?
 - Under what conditions should the company contact major customers and suppliers?
 - When should the authorities be contacted?



Eradication and Incident Follow-Up

- Before eradication: ensure all necessary evidence is collected/logged and verify backups are clean.
- Eradication
 - Before the IT security group begins eradication efforts, it must collect and log all possible criminal evidence and then verify all backups are current, complete, and free of malware.
- Incident Follow-Up
 - An essential part of follow-up is to determine how the organization's security was compromised so that it does not happen again.
 - A formal incident report documents a detailed chronology of events, the root cause and the impact of the incident.
 - Policy updates and improvements

Evidence Recording

- Incident log: A chronological diary of the incident: who did what, when, why, and with what authorization. Think “timeline of actions & decisions.” It’s about people + time + rationale. New owner adds a line to this after handoff.
- Evidence inventory: A catalog of artifacts you collected: each file/log/screenshot with ID, description, hash, storage location, and why it was collected. Think “index of objects and their integrity.”
- Chain of custody: A movement ledger for each evidence item: every hand-off/access (From → To, date/time UTC, purpose, signature/ID). Can be kept separately or in the inventory (a per-item custody log)
- Artifacts: The actual files
- Incident & Evidence Note: 1 page summary, points to items in inventory and references custody.
- Note: These are all append-only, retains all prior entries and they cannot be modified. If something is wrong, add a correction.

Authorization & scope

- Do only what's approved
- Stay inside the ticket/tasking/role
- No “curiosity clicks”
- No out-of-scope scans
- Must explicitly state in incident log – who authorized, to do what, on which assets, and when (time window).

Evidence Collection

	Legal	Not Legan
Ethical		
Not Ethical		

Minimum Necessary Evidence Collection

- Collect only what's needed for the purpose of investigating/containing incident
- Avoid content collections or bulk grabs unless explicitly approved
- Request expansion only if necessary
- Less collected = fewer people exposed and faster review. Less is ethically more!
- Capture:
 - Single malicious email .eml (full headers+body) — shows source path & indicators (SPF etc..)
 - Targeted Auth logs ($\pm 15-30$ min) — correlates user/time without over-collection, context, enough to test hypothesis
 - Process list and network statistics — confirms live behavior near event
- Ignore:
 - Full mailbox exports — bulk content/PII; over-collection, privacy risk, not needed/slows analysis
 - Full-day logs — privacy risk; slows analysis.
 - Passwords/tokens in notes — creates new exposures, don't copy secrets
 - Campus-wide packet capture

Chain of Custody

- Organizations should document all details of a security incident as it happens
- So evidence is trustworthy (accurate, could be used in criminal cases)
- A complete record of specific actions taken and all conversations in a logbook
- Who captured/handled what, when, storage location, and any changes for each item.
- Maintain chain of custody rows:

[ItemID] | [Description] | [From/To] | [UTC time] | [Location] | [Action/Purpose] | [Signature/ID].

- Tip: write custody rows as you capture; don't add them later
- Use UTC for each row!

Redaction & Evidence Storage

- Blur/box PII/creds/tokens
- Label all edits/redactions (“brightness adjusted, PII redacted”).
- Do not share in chats/email
- Store in restricted evidence path
- Log access to case files
- Hashing is cryptographic identifier of a file. Not encryption!
- The same file will have the same hashing, a slightly different file has a different hash.
- Used to identify any changes to evidence
- Record SHA-256 for saved artifacts. In read/append only manifest.

Screenshot Redaction

- Header: UTC, page/app title, URL/source, context
- Body: Relevant pane only; visible redaction boxes; note any edits.
- Footer template:

UTC Time • Source/URL • Captured by [name] • Case ID • Hashing SHA-256 • Redactions • Edits



Containment Trade-offs

- Containment without chaos: choose responses that limit damage and preserve proof.
- Select containment based on asset criticality and impact
- Preserve evidence while limiting harm
- Avoid knee-jerk wiping which destroys context.

Choose the lightest control that manages risk (asset criticality + user impact + evidence value):

- Soft: revoke sessions/tokens/access; reset password; block compromised domains; disable account; additional user monitoring for 48hr
- Medium: network-isolate host (reduces spread; if authorized delay isolation to capture volatile data first)
- Hard: rebuild/wipe (only with approval; document thoroughly first)
- When to isolate: active malicious process, data exfiltration signs, or you can't safely reset/revoke without the host cooperating. Grab one volatile snapshot first (authorized).
- When to reimage: only when analysis indicates persistence or high-risk malware *and* you've saved necessary artifacts; document pre-wipe evidence and all approvals.

Weekly Reflection

Purpose:

- Practice ethical first-hour incident choices that respect privacy, policy, and evidence integrity.

Write (≈350–500 words):

- What I learned (6–8 sentences): Summarize the NIST incident lifecycle and why minimum necessary matters; tie to the eBook's harm-prevention theme.
- How I'll apply it (1 paragraph): A realistic campus or small-business scenario—list two items to capture and one to avoid with justification (scope/consent).
- Muddiest point (3–4 sentences): One precise question on chain of custody, redaction, or containment trade-offs.
- Portfolio note (2–3 bullets): What you'll publish and why it matters.
- AI use: Allowed with disclosure (add AI Use Note).
- Assessment:
 - Understanding (30) • Application (30) • Muddiest Point (20) • Portfolio Note (10) • Clarity & Mechanics (10)



First-Hour Priorities

- Act within authorization. Write authorization line first.
- Capture minimal targeted evidence:
 - E.g. one malicious email .eml; 15–30 min auth window; one process/ports log
- Avoid trying to "prove it" through ongoing monitoring/privilege escalation
- Record custody rows as you go not later, ensures accuracy, integrity, usability.
- Make a containment recommendation (soft/med/hard) + one-sentence why.

Incident & Evidence Note

- Real world: One shared note per incident links to logs. For CYBR-2100: Write a complete note including all info.
- Timestamp & Context (UTC) — who told you what, when.
- Authorization — who approved which actions on which assets.
- Actions you took — One line for each step, any commands/tools used, stick to facts
- Evidence Inventory — exact file/log paths; hashes (if file); why it's minimum necessary.
- Chain of Custody — intake rows, storage location; handlers/times etc.
- Redaction — what you removed (PII/creds) and how.
- Next Step — recommended containment/recovery handoff (to which role?)

Incident & Evidence Note - Template

- Incident #
- Timestamp (UTC) & Context: [YYYY-MM-DD HH:MM UTC] — Initial incident declaration: notified by [name/role] that [summary]. Ticket created with [IncidentID].
- Authorization: [Name/role] approved [actions] on [asset(s)] for [time window].
- Actions Taken: Ran [cmd/tool] on [host]; collected [log path]; isolated [asset] per approval
- Evidence Captured: Item [path or file] — SHA-256: [hash] — Why: [reason tied to hypothesis/window]
- Chain of Custody: Stored at [location]; access: [names/times]; transfer records kept.
- Redaction: Removed [PII/creds]; method [blur/box]; Note: unredacted copy should still be retained.
- Next Step: Recommend [containment/recovery] (handoff to [team]).

What not to include

- No credentials, passwords, tokens, API keys in notes/screen grabs
- Avoid bulk content/payloads
- Rationale: minimum necessary keeps evidence defensible and respectful of privacy.
- No speculation/accusations; write observations only until verified
- No Proof of Concept/exploit steps unless authorized and via secure channel
- No creeping scope: don't escalate privileges to "confirm" compromise unless expressly approved

How to spot a Phishing attack?

- Look-alike domains and mismatched Return-Path are classic signs.
- Look-alike IT notices: “password check,” “mailbox quota,” “MFA reset.”
- Payroll/financial lures: “update direct deposit,” “past-due tuition.”
- Timely action required: “be the first to...” creates urgency
- Doc-share baits: fake “shared syllabus” links.



What happens if someone clicks?

What user thinks they're doing: registering or validating for a legit event.

What actually happens:

- They land on a page (remote or an attached HTML form) that looks official.
- They type their username/password.
- The credentials get posted to the attacker.
- The attacker tests those credentials immediately
- If MFA isn't enabled—or if the attacker tries push-fatigue—they may get in and set mailbox rules, pull data, or try VPN/ShareDrive.



What triggers a phishing incident?

- Email auth flag
- User reports
- IdP detections (unfamiliar sign-in properties, impossible travel, sudden password-only attempts)
- Multiple recipients hit simultaneously by similar mail

Email Authentication Protocols

- SPF (Sender Policy Framework) = “Is this IP allowed to send mail for that domain?”
 - Does the sending server’s IP match what the domain’s DNS says is allowed to send?
 - Result: spf=pass -> allowed
 - Spf=fail -> Not allowed, strict policy
 - Spf=softfail-> not allowed byt sender’s policy asks for leniency
- DKIM (DomainKeys Identified Mail) = “Did the sender’s domain cryptographically sign this?”
 - Sender’s server cryptographically signs parts of the message with a private key; receivers fetch the public key from DNS and verify
 - Result: dkim=pass means the signature checks out
 - Dkim=fail often signals tampering/spoof
- DMARC (Domain-based Message Authentication, Reporting & Conformance): “What policy should receivers follow if SPF/DKIM fail?”
 - Policy that requires alignment between the visible From: domain and SPF/DKIM.
 - If alignment fails and policy says p=reject, receivers may drop or quarantine; result: dmarc=pass/fail

Email Authentication Protocols

- Forwarding & mailing lists can break SPF and sometimes DKIM
- Some phishers also DKIM-sign compromised accounts, so a pass is not innocence.
- Alignment matters: DMARC wants From: domain to align with SPF or DKIM.
- Treat these results as clues, not verdicts. You still need other evidence to tell the story.
- If SPF fails but the email came through a known forwarder, be cautious; collect the email and correlate with other signals before recommending containment.
- You don't need to decode these just quote the results from headers and explain what they imply (spoof vs. likely legit).
- Header hint: dmarc=fail with policy p=quarantine or p=reject strengthens the case it's phish.

Email Validation: SPF/DKIM/DMARC

Original Message

Message ID	<51271495.17225.1757374337383@ip-10-146-252-180.ec2.internal>
Created at:	Mon, Sep 8, 2025 at 7:32 PM (Delivered after 9 seconds)
From:	"Dianne Fleming - flemingd@hocking.edu" <donotreply@blackboard.com>
To:	
Subject:	one-hour prof dev webinar for faculty
SPF:	PASS with IP 69.196.241.1 Learn more
DKIM:	'PASS' with domain blackboard.com Learn more
DMARC:	'PASS' Learn more



Email Validation: SPF/DKIM/DMARC

Return-Path: <donotreply@blackboard-mail.support>
Received: from mx2.hocking.example (10.12.34.21)
by mailhub.hocking.example with ESMTTP id 3F7A4C201
for <alex.lee@hocking.example>; Mon, 08 Sep 2025 23:32:22 +0000 (UTC)
Received: from edge-smtp07.sender-net.example (198.51.100.27)
by mx2.hocking.example with ESMTTPS id 3F7A4C200; Mon, 08 Sep 2025 23:32:22 +0000
Received: from app01.blackboard-mail.support (203.0.113.78)
by edge-smtp07.sender-net.example with ESMTTP id 9C1D2E0
for <alex.lee@hocking.example>; Mon, 08 Sep 2025 23:32:07 +0000
Authentication-Results: mx2.hocking.example;
spf=pass smtp.mailfrom=donotreply@blackboard-mail.support;
dkim=pass header.d=blackboard-mail.support;
dmarc=fail (p=reject) header.from=blackboard.com
From: "Blackboard Learn" <donotreply@blackboard.com>
Reply-To: "Support" <support@blackboard-mail.support>
To: Alex Lee <alex.lee@hocking.example>
Subject: one-hour prof dev webinar for faculty – registration update
Date: Mon, 08 Sep 2025 23:32:05 +0000
Message-ID: <20250908.233205.9c1d2e0@app01.blackboard-mail.support>
MIME-Version: 1.0
Content-Type: text/html; charset=UTF-8

```
<html>  
<body>  
  <p>Join us Wed 2:00–3:00 PM ET. Confirm your <b>teaching account</b> before joining.</p>  
  <p><a href="https://learn-webinar.blackboard-mail.support/login">Registration</a></p>  
</body>  
</html>
```



Email Validation: Minimum Lines Example

From: "Blackboard Learn" <donotreply@blackboard.com> ← brand the user trusts

Reply-To: support@blackboard-mail.support ← different domain

Authentication-Results:

spf=pass smtp.mailfrom=donotreply@blackboard-mail.support

dkim=pass header.d=blackboard-mail.support

dmARC=fail (p=reject) header.from=blackboard.com ← alignment FAIL (spoof)

Body:

Join us Wed 2:00–3:00 PM ET. Confirm your teaching account before joining:

Registration: <https://learn-webinar.blackboard-mail.support/login>



Email Validation Analysis

- Display-name spoofing: Set the display name to “Blackboard Learn” so the inbox shows a familiar name, even if the address or domain is different.
- DMARC misalignment spoof: Put From: donotreply@blackboard.com in the header but actually send from a different domain the attacker controls (e.g., blackboard-mail.support). If the brand’s DMARC policy is weak (p=none) or receivers are lenient, the message might still be delivered—even though alignment fails.
- Account compromise (harder but nastier): Attackers steal credentials from a real vendor or partner and send from the legitimate domain with valid DKIM/SPF. In that case, auth checks can pass because the sender really is permitted—your clue comes from the content and links, not auth failures.

What other evidence do we have?

Web proxy:

- A traffic bouncer for web browsing.
- Logs outbound HTTP/HTTPS from devices: time, source IP, destination host, URL path, status, bytes.
- Can spot a GET request to a fake login page followed by a POST (i.e. credentials being sent).

Identity Provider (IdP):

- The service that proves identity for SSO
- Sign-in logs record each login attempt: timestamp (UTC), user, result (success/fail), auth factor (password vs MFA), client IP/location, device ID, app being accessed, client OS/browser, and risk flags (e.g., *impossible travel*)
- It's minimal (no message content) and can be used to tell user and attacker apart.
- Password-only attempts right after the click = harvest signal.

IdP Logs

What to inspect:

- Timing
- Result + Factor: SUCCESS/FAIL and factor=Password/MFA
- Client IP: campus NAT / known ranges vs unfamiliar IP
- Device: known device ID / “compliant” vs blank/unknown
- Client app: what app the login targeted (VPN, ShareDrive, Email, etc.)
- Risk/Signals: *Unfamiliar sign-in properties, Impossible travel*, etc.
- Client OS/Browser: “Windows/Chrome” vs odd combos



IdP Logs Example

2025-09-08T23:20:12Z user=alex.lee result=SUCCESS factor=MFA(method=push)

client_ip=198.51.60.10 location="Campus-NAT"

device="WIN10-ALee-Laptop" device_state=Compliant client_os=Windows10 client_browser=Chrome

app="Email" risk=Low

2025-09-08T23:33:27Z user=alex.lee result=FAIL factor=Password

client_ip=198.51.100.54 location="Unfamiliar"

device="-" client_os=Linux client_browser="Chrome/125"

app="VPN" risk=High signals="[UnfamiliarSignInProperties]"

2025-09-08T23:33:58Z user=alex.lee result=FAIL factor=Password

client_ip=198.51.100.54 location="Unfamiliar"

device="-" client_os=Linux client_browser="Chrome/125"

app="ShareDrive" risk=High signals="[UnfamiliarSignInProperties]"

2025-09-08T23:40:12Z user=alex.lee result=SUCCESS factor=MFA(method=push)

client_ip=198.51.60.10 location="Campus-NAT"

device="WIN10-ALee-Laptop" client_os=Windows10 client_browser=Chrome

app="Email" risk=Low

Phish Containment

- Recommend **soft containment**; escalate only if you see host persistence or lateral movement
- Preserve, then protect.
- Minimize blast radius with targeted actions
- Rationale matters. In your note, write the why for each containment step!
- Soft: reset password; revoke sessions/tokens; block look-alike domain/email; shorter session lifetimes .
- Medium: isolate the PC if network intercept shows active malware on that asset, only after snapshot of volatile data.
- Hard: rebuild only if needed and approved.

Note Example

Incident #HC_IR_101

2025-09-08T23:35:00Z —Notified by student Alex Lee that a “Blackboard webinar” email looked suspicious and included a login link.

Ticket created.

Authorization:

IR Manager (J. Smith) approved collection of one email (.eml) and Identity Provider (IdP) sign-in lines for alex.lee between 23:20Z–23:50Z. No other assets authorized.

Actions Taken:

- 23:38Z — Exported the reported message as raw .eml (headers + body intact).
- 23:40Z — Exported IdP sign-in events for alex.lee within approved window 23:20–23:50Z (single user, narrow window)
- 23:41Z — Calculated SHA-256 for both artifacts; recorded evidence inventory and chain-of-custody.
- 23:45Z — Completed analysis; prepared recommendation (soft containment).

Note Example (cont.)

Evidence Captured:

Item ID: EV-001

Description: Phishing email (.eml; headers+body)

SHA-256: ????????

Collected: 23:38Z

Collector: Name Here

Location: /incident/HC_101/Artifacts/EV-001_Original_Email.eml

Why: Shows DMARC alignment failure (brand in From is blackboard.com; authentication passes for attacker's look-alike domain), plus a look-alike login link. This establishes spoof and a possible credential-harvest lure.



Note Example (cont.)

Item ID: EV-002

Description: IdP sign-in log (23:20–23:50Z)

SHA-256: ??????

Collected: 23:40Z

Collector: Name here

Location: ???

Why: Shows password-only fails from unfamiliar IP/device right after phish email; MFA successes bookend.

Note Example (cont.)

Chain of Custody:

Time (UTC)	ItemID	From	To	Location/Path (logical)	Purpose/Action	Sign/ID
23:38Z	EV-001A	Collector	Evidence	\evidence\HCL-101\02_Artifacts\EV-001A...	Intake; added; hashed	JD
23:40Z	EV-002A	Collector	Evidence	\evidence\HCL-101\02_Artifacts\EV-002A...	Intake; added; hashed	JD
23:45Z	EV-001A	Evidence	IR Manager	(same)	Review only for decision	KM

Note Example (cont.)

Redaction:

List any redactions made to evidence and why.

e.g. Redact non target user information on IdP evidence log. Filter csv to do this.

Next Step:

Recommend soft containment due to [likely attack vector/impact]

Actions include: resetting user alex.lee password, revoke tokens/sessions, and block *.blackboard-mail.support in email/web filters.

Monitor for 48h for additional attempts on the account.

Handoff to IdP Manager for decision

In-Class Activity With Prompt

Task (≈1 page, bullet-friendly)

- Write an Incident & Evidence Note from a short prompt (log + email excerpt) provided in class. Keep it factual and concise.
- Phishing Exercise Prompt: TBD
- Assessment
 - Preparation & Participation (20) • Apply Ethics & Law (40) • Collaboration & Professionalism (20) • Deliverable Quality (20)



Portfolio Artifact

- Sections:
 - My First-Hour Priorities (3–5 bullets): What you capture vs. avoid (with why).
 - Incident & Evidence Note (final): Paste your refined note.
 - Integrity & Privacy Controls (short paragraph): Hashing, storage location, redaction policy.
 - Evidence Links: Upload or link the in-class note and reflection PDF.
 - Reflection (3–4 sentences): Trade-offs you'd revisit next time.
 - AI Use Note (if used).
- Do not include: PII, credentials, or exploit steps.
- Assessment:
 - Ethical & Legal Accuracy (40) • Evidence & Artifacts (20) • Reflection & Growth (20) • Presentation & Mechanics (20)

Remember

- First-hour discipline: act within authorization, capture the minimum necessary, and write notes others can trust.
- Privacy by default: narrow scopes and redact PII to reduce harm and review burden.
- Defensible evidence: integrity, storage, and chain of custody make artifacts usable later.
- Containment without chaos: choose responses that limit damage and preserve proof.

