

## Activity 2: SOC Analyst Simulation

Enterprise Incident Response with AI Partnership (Grades 9-12)

Dr. Ryan Straight

2025-12-07

### ! Instructor Overview

Students operate as a Security Operations Center (SOC) team responding to a realistic enterprise security incident. This simulation mirrors authentic SOC workflows where analysts coordinate with AI-powered Security Orchestration, Automation, and Response (SOAR) platforms. Students experience the NICE Framework's incident response work roles while developing critical thinking about human-AI collaboration in high-stakes situations.

**Duration:** 55-60 minutes **Grade Levels:** 9-12 **Group Size:** Teams of 4-5 students **Technology:** One device per student recommended; minimum one per team

## Learning Objectives

Students will:

- Execute **incident response procedures** aligned with industry frameworks (NIST, SANS)
- Operate within **NICE Framework Work Roles** during crisis response
- Leverage AI as a **SOC analyst partner** while maintaining human decision authority
- Analyze **technical indicators** and correlate evidence across multiple sources
- Practice **stakeholder communication** during active incidents
- Evaluate **AI recommendations** critically against organizational context

## CYBER.org Standards Alignment (9-12)

- **9-12.SEC.INC:** Incident detection, response, and recovery procedures
- **9-12.SEC.FOR:** Digital forensics fundamentals
- **9-12.SEC.MON:** Security monitoring and analysis
- **9-12.SEC.THR:** Advanced threat analysis

## NICE Framework Alignment

**Primary Work Roles:** - Incident Responder (PR-CIR-001) - Cyber Defense Analyst (PR-CDA-001) - Cyber Defense Incident Responder (PR-CDA-001)

**Supporting Work Roles:** - Threat/Warning Analyst (AN-TWA-001) - Security Operations Center Analyst (OV-SOC-001)

## Simulation Environment

### TechCorp Industries Security Operations Center

**Organization Profile:** - Mid-size manufacturing company (2,500 employees) - IT infrastructure: Hybrid cloud (Azure/on-premises) - Security stack: CrowdStrike EDR, Splunk SIEM, Microsoft Defender - AI Capability: "SentinelAI" SOAR platform with automated detection and response

**Your Role:** SOC Team working the 7AM-3PM shift

**Context:** SentinelAI has flagged a series of alerts requiring immediate human analysis and response. As the human operators, you must interpret AI findings, make critical decisions, and coordinate response across the organization.

**Key Constraint:** SentinelAI can detect patterns and recommend actions, but all containment, escalation, and communication decisions require human authorization.

## SOC Team Roles

### Incident Commander (IC)

**NICE: Cyber Defense Incident Responder** - Coordinates overall response effort - Makes final containment and escalation decisions - Manages communication with leadership - Balances technical response with business impact

### Lead Analyst

**NICE: Cyber Defense Analyst** - Performs deep technical analysis of indicators - Correlates data across multiple sources - Develops attack timeline and scope assessment - Works directly with SentinelAI for pattern analysis

### Threat Intelligence Analyst

**NICE: Threat/Warning Analyst** - Researches threat actor TTPs - Provides context from threat intelligence feeds - Identifies attack campaign characteristics - Uses AI to correlate with known threat patterns

### Communications Specialist

**NICE: Related to Cybersecurity Management** - Drafts internal and external communications - Coordinates with legal and PR teams - Documents incident timeline - Prepares executive briefings

### Evidence Coordinator (Optional 5th role)

**NICE: Cyber Defense Forensics Analyst** - Ensures evidence preservation - Maintains chain of custody documentation - Coordinates with law enforcement if needed - Manages forensic data collection priorities

## The Incident

**Initial Alert: 7:12 AM**

**SentinelAI Priority: CRITICAL**

Multiple high-confidence alerts detected across manufacturing floor network segment:

ALERT CLUSTER #7291  
 Timestamp: 07:12:03 UTC  
 Severity: CRITICAL  
 Confidence: 94%

**Indicators Detected:**

- Lateral movement patterns (MITRE ATT&CK T1021)
- Unusual service account authentication (T1078.002)
- Large data staging activity on file server MFG-FS-01 (T1074)
- C2 beaconing to known malicious infrastructure (T1071)

**Affected Systems:**

- MFG-WORKSTATION-042 through MFG-WORKSTATION-089 (47 systems)
- MFG-FS-01 (file server, 2.3TB sensitive data)
- HVAC-CONTROLLER-01 (OT/IT bridge system)

**Automated Actions Taken:**

- Alert generation: COMPLETE
- Network traffic logging: ENABLED
- Endpoint isolation: AWAITING HUMAN AUTHORIZATION

**Recommended Human Actions:**

1. Authorize endpoint isolation (Impact: Manufacturing operations)
2. Activate incident response protocol
3. Escalate to CISO and Operations leadership

## Evidence Packages

### Evidence Package A: Network Logs

TIME	SRC_IP	DST_IP	PORT	PROTOCOL	BYTES	FLAGS
07:02:15	10.50.42.102	10.50.42.103	445	SMB	1.2MB	SYN
07:02:18	10.50.42.102	10.50.42.104	445	SMB	1.1MB	SYN
07:02:21	10.50.42.102	10.50.42.105	445	SMB	1.3MB	SYN
[Pattern repeats for 47 workstations]						
07:08:44	10.50.42.102	185.234.XX.XX	443	HTTPS	256KB	ENCRYPTED
07:08:47	10.50.42.102	185.234.XX.XX	443	HTTPS	512KB	ENCRYPTED
07:09:02	10.50.42.102	185.234.XX.XX	443	HTTPS	1.1MB	ENCRYPTED
[Beaconing every ~20 seconds continues]						

### Evidence Package B: Authentication Logs

TIMESTAMP	USER	SYSTEM	RESULT	METHOD
06:58:22	svc_backup	MFG-FS-01	SUCCESS	Kerberos
06:58:24	svc_backup	MFG-WORKSTATION-042	SUCCESS	Kerberos
06:58:26	svc_backup	MFG-WORKSTATION-043	SUCCESS	Kerberos
[Continues for all affected systems]				

Note: svc\_backup account normally runs at 02:00 AM for nightly backups

Last password change: 847 days ago

Service account owner: IT Operations (no specific owner assigned)

### Evidence Package C: Endpoint Detection Data

MFG-WORKSTATION-042:

- Process: cmd.exe spawned by outlook.exe (07:01:44)
- File Drop: C:\Users\jsmith\AppData\Local\Temp\update.exe
- Hash: 3a4b5c6d7e8f... [MATCHES KNOWN THREAT: APT29 TOOLING]
- Registry: HKLM\Software\Microsoft\Windows\CurrentVersion\Run [PERSISTENCE]
- Network: Connection to 185.234.XX.XX:443 every 20 seconds

User jsmith:

- Role: Manufacturing Floor Supervisor
- Email received: 06:55:12 - Subject: "URGENT: Updated Shift Schedule"
- Attachment opened: 07:01:41 - schedule\_update.docm

### Evidence Package D: Threat Intelligence

IP: 185.234.XX.XX

- First seen: 2024-09-15
- Attribution: SUSPECTED APT29/Cozy Bear
- Campaign: MANUFACTURING-AUTUMN targeting industrial sector
- TTPs: Spearphishing → Service account abuse → Data staging → Exfiltration
- Past targets: Automotive, aerospace, manufacturing organizations
- Objective: Industrial espionage, supply chain intelligence

File Hash: 3a4b5c6d7e8f...

- Malware family: SUNSPOT variant
- Capabilities: Keylogging, credential harvesting, file staging
- Evasion: Living-off-the-land techniques, encrypted C2

### Evidence Package E: Business Context

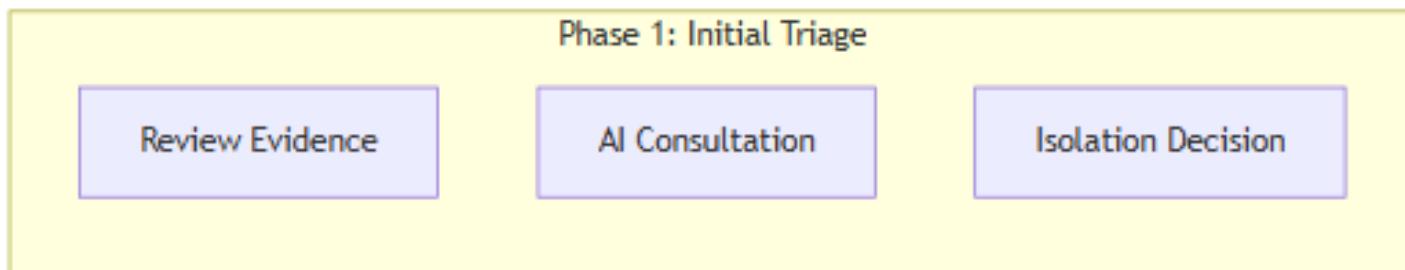
OPERATIONAL CONTEXT:

- Manufacturing floor runs 24/7, current shift change at 07:00
- MFG-FS-01 contains: Product designs, supplier contracts, pricing data
- HVAC-CONTROLLER-01 manages climate control for sensitive equipment
- Q4 production deadline in 2 weeks - high pressure environment
- Recent layoffs created employee morale concerns
- CEO presentation to board scheduled for Friday

PREVIOUS INCIDENTS:

- Phishing attempt blocked 3 weeks ago (similar TTP)
- Service account audit recommended 6 months ago (not completed)
- OT/IT segmentation project delayed due to budget

## Response Framework



### SOC Incident Response Workflow

#### Phase 1: Initial Triage (10 minutes)

**All Team Members:** 1. Review assigned evidence package 2. Document initial observations 3. Prepare briefing for team

##### SentinelAI Consultation (Lead Analyst):

“Analyze these network patterns [paste logs]. What attack progression do they indicate? Map to MITRE ATT&CK framework.”

“Compare this hash and IP against your threat intelligence. What campaign does this align with? What typically comes next in this attack chain?”

**Key Decision Point:** - Authorize endpoint isolation? 47 manufacturing workstations offline = production impact - SentinelAI recommends: YES (93% confidence attack in progress) - Human consideration: Shift change happening, 200 workers need workstations

#### Phase 2: Analysis and Scoping (15 minutes)

**Lead Analyst Tasks:** - Build attack timeline - Identify patient zero and attack vector - Assess scope of compromise - Determine if data exfiltration occurred

**Threat Intel Tasks:** - Research APT29 TTPs - Identify likely objectives - Predict next attack phases - Assess attribution confidence

**IC Tasks:** - Prioritize response actions - Assess business impact of containment options - Prepare leadership notification - Coordinate team activities

**Communications Tasks:** - Draft executive summary - Prepare manufacturing leadership notification - Document decision log - Track timeline

#### Phase 3: Response Execution (15 minutes)

##### Critical Decisions Required:

Decision	Options	AI Recommendation	Business Impact	Risk if Delayed
Endpoint Isolation	Full / Partial / None	Full isolation	High - production stops	Very High - data loss

Decision	Options	AI Recommendation	Business Impact	Risk if Delayed
Network Segmentation	Activate / Monitor	Activate	Medium - IT overhead	High - lateral movement
Credential Reset	Immediate / Scheduled	Immediate	Medium - user disruption	Critical - persistence
Law Enforcement	Notify / Wait	Wait for scope	Low	Medium - evidence
Executive Escalation	Now / After containment	Now	Low	Medium - trust

**Team must document:** - Decision made - Rationale - AI input considered - Human factors that modified AI recommendation

#### Phase 4: Communication (10 minutes)

##### Draft required communications:

1. **Executive Flash Report** (for CEO/CISO)
  - Incident severity and scope
  - Immediate actions taken
  - Business impact assessment
  - Next steps and timeline
2. **Operations Notification** (for Manufacturing VP)
  - Operational impact
  - Workaround procedures
  - Expected resolution timeline
3. **IT Staff Directive**
  - Technical containment actions
  - Evidence preservation requirements
  - Coordination instructions

#### Phase 5: Debrief (10 minutes)

##### Team Discussion:

1. **What did SentinelAI do well?**
  - Pattern detection speed
  - Threat intelligence correlation
  - Attack chain mapping
  - Risk quantification
2. **Where did human judgment matter most?**
  - Business context interpretation
  - Stakeholder communication
  - Trade-off decisions
  - Ethical considerations

### 3. What would happen without AI?

- Detection delay (hours vs. minutes)
- Analysis depth limitations
- Correlation challenges
- Response speed impact

### 4. What would happen without humans?

- Context-blind automation
- Business disruption from over-response
- Stakeholder communication gaps
- Ethical oversight absence

## Assessment Rubric

Criterion	Developing (1-2)	Proficient (3)	Advanced (4)
<b>Technical Analysis</b>	Surface-level review	Solid evidence correlation	Deep technical understanding with attack chain mapping
<b>AI Partnership</b>	Used AI as answer machine	Collaborated with appropriate skepticism	Strategic consultation with critical evaluation
<b>Decision Quality</b>	Decisions without clear rationale	Documented reasoning for decisions	Sophisticated trade-off analysis with business context
<b>Role Execution</b>	Unclear responsibilities	Fulfilled role requirements	Leadership within role, supported by teammates
<b>Communication</b>	Unclear or missing documentation	Clear documentation produced	Professional-quality stakeholder communications
<b>NICE Alignment</b>	No connection to work roles	Basic awareness of career paths	Articulated how roles connect to industry careers

## Assessment Connection

This table shows how activity elements connect to assessment rubric criteria:

Rubric Criterion	Developed Through	Evidence Source
<b>AI Partnership Framing</b>	Phase 1: SentinelAI consultation with role-specific prompts	Quality of AI queries and response interpretation
<b>Complementary Strengths</b>	Phase 5 Debrief: “What did AI do well?” vs. “Where did human judgment matter?”	Debrief discussion responses and documentation

Rubric Criterion	Developed Through	Evidence Source
<b>AI Limitation Awareness</b>	SentinelAI “LIMITATION NOTICE” and human decision authority requirement	Phase 3 decision rationale showing where AI recommendations were modified
<b>Synthesis Quality</b>	Decision Matrix: integrating AI recommendation with business impact and risk analysis	Completed decision documentation with rationale
<b>Human Context Application</b>	Evidence Package E: Business Context informing response decisions	How business context modified purely technical AI recommendations
<b>Decision Justification</b>	Phase 3 documentation: Decision, Rationale, AI input, Human factors	Quality and depth of documented decision rationale
<b>NICE Framework Application</b>	Role Cards with explicit NICE Work Role alignment, Career Connections section	Debrief “career insights” responses and role execution quality

**Applicable Rubrics:** [Human-AI Collaboration Rubric](#), [Decision-Making Quality Rubric](#), [NICE Framework Application Rubric](#)

### Career Connections

#### This Simulation Reflects Real SOC Work

**What you experienced today:** - Alert triage from SIEM/SOAR platforms → Real SOC analysts do this continuously - AI-assisted analysis → CrowdStrike, Splunk, Palo Alto all have AI capabilities - Team coordination → SOCs have tiered analysts and specialized roles - Executive communication → Critical skill for career advancement

#### NICE Framework Career Pathways

Work Role	Starting Salary	Growth Rate	Your Simulation Role
SOC Analyst (Entry)	\$55-75K	33% (2022-2032)	All roles
Incident Responder	\$75-100K	35%	Incident Commander
Threat Intelligence Analyst	\$80-110K	31%	Threat Intel
Security Engineer	\$90-130K	35%	Lead Analyst
CISO (Executive)	\$200-400K	28%	IC → Long-term path

#### Certifications That Prepare You

- **CompTIA Security+** → Foundation for all roles
- **CompTIA CySA+** → SOC Analyst focus
- **GIAC GCIH** → Incident Handler certification
- **CISSP** → Advanced/Management roles

## Low-Resource Adaptation

If AI access is unavailable, provide this SentinelAI analysis report as handout:

### **SentinelAI Analysis Report #7291-A**

Pattern analysis indicates lateral movement consistent with credential-based attack. Service account svc\_backup shows authentication pattern anomaly: normal operation 02:00-03:00, current activity 06:58-07:12. Statistical deviation: 99.7th percentile.

Attack chain mapping: Initial Access (T1566.001) → Execution (T1204.002) → Persistence (T1547.001) → Credential Access (T1078.002) → Lateral Movement (T1021.002) → Collection (T1074.001) → Command and Control (T1071.001)

Confidence assessment: 94% probability active compromise in progress. Recommended action: Immediate containment. Risk if delayed 2 hours: Estimated 800GB additional data staging, potential OT system access.

**LIMITATION NOTICE:** This analysis does not account for: manufacturing production schedules, employee shift patterns, business-critical deadlines, stakeholder communication requirements, or reputational impact assessment. Human decision authority required.