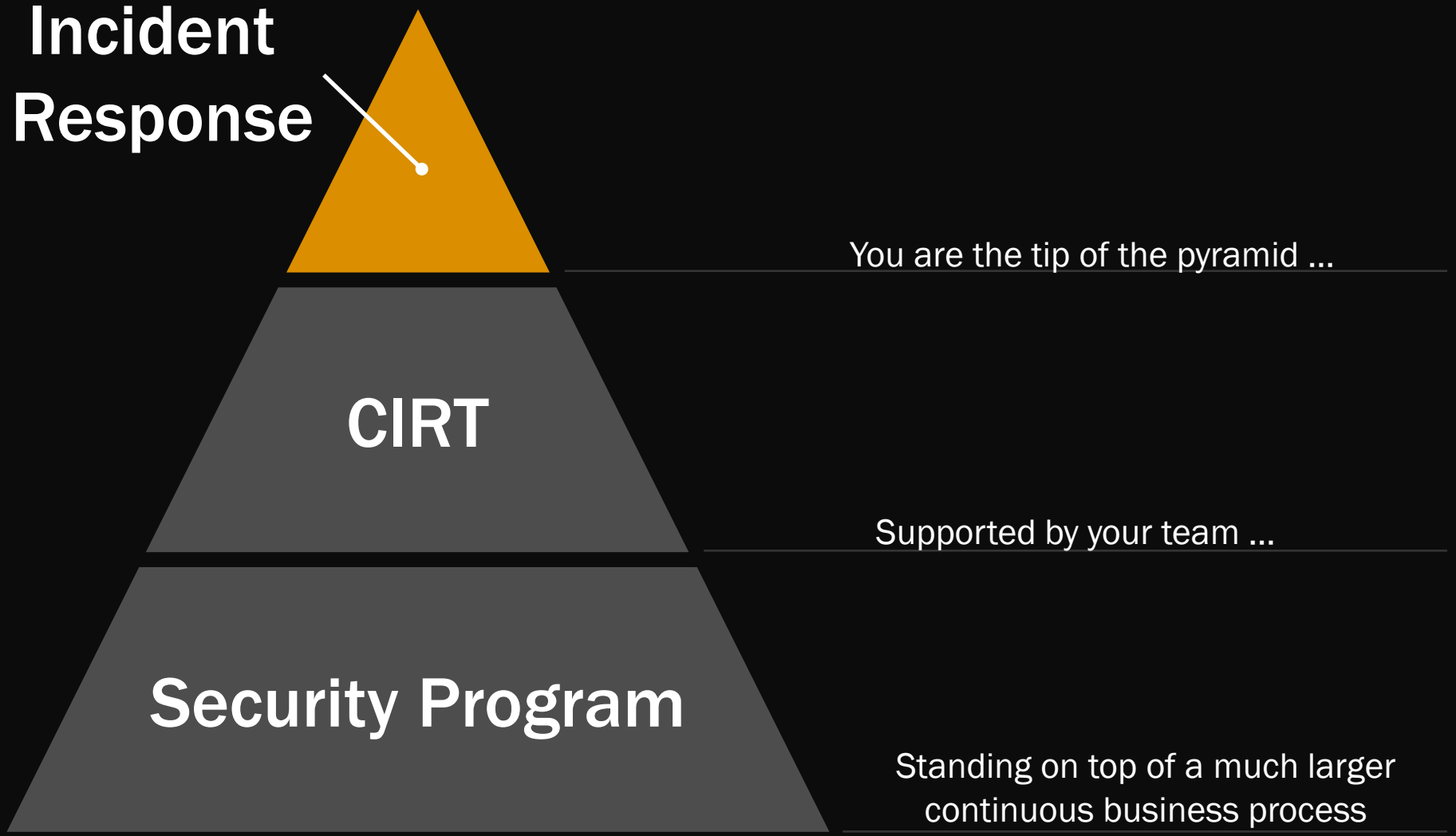
Blue Team Perspectives

The Business of Incident Response

Putting Myself in Context

- **Professional**
  - High tech IT consultant for startups
  - Independent computer forensics practitioner
  - Now global consulting firm incident response manager, designer, implementer
- **Personal**
  - Volunteer search and rescue
  - Pilot – sailplanes, fixed wing, rotorcraft, FPV, UAV, ….

Incident Response Context



Working Assumptions

Compromise is inevitable

Something truly malicious
has been in,
is in,
and will be in
your environment

Working Assumptions

Incident Response is Part of Continuous Business Process

- Response is a misnomer - it must be proactive to succeed at being reactive
- The CIRT does not stand apart, or exist in a vacuum
- Someone needs to represent CIRT to the business, and vice versa

Working Assumptions

People > Processes > Tools

- People are more important than tools
- Good processes are more important than tools
- Good teams are more important than tools
- That said, you still need to invest in good tools

What Is An Incident?

What is in scope for your incident response program?

- Stolen laptop
- DDOS
- Commodity malware
- APT
- RBN
- Espionage
- Generic phishing

What Is An Incident?

Define “incident” yourself lest others define it for you

- **Put it down in writing**
- **Once defined, stick to it**
  - Don’t get sucked into stolen laptops and HR issues
  - You can support, but not own, related issues
- **Feature creep and scope drift apply**

What is an Incident?

Scope of Incident Response Program

Now that you've defined what an incident is, you can determine the scope of your incident response program

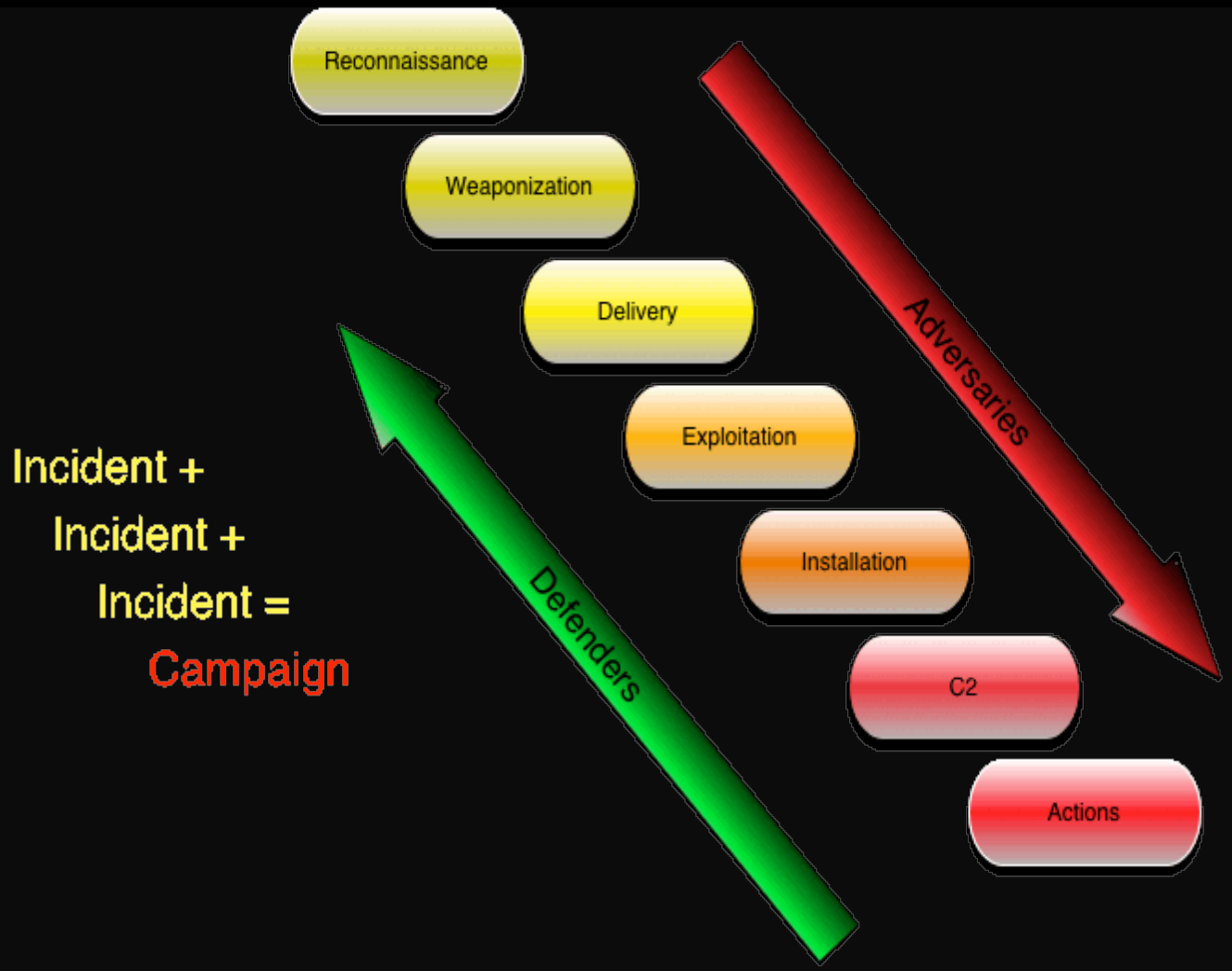
Indicators and Threat Intelligence

Data is not threat intelligence

- **Determine what “Threat Intelligence” is for you**
- **Find sources that apply to your organization**
  - Business and services
  - Geography
  - Politics
- **Learn to develop, track, and share IOCs**

Kill Chains

With thanks to Lockheed Martin for the cyber version



Threat Intelligence & Documentation

George Santayana

… and when experience is not retained, as among savages, infancy is perpetual. Those who cannot remember the past are condemned to repeat it.

Who is Part of Your Immediate Team

People and Groups

Who is part of your direct team?

- Incident response team
- Computer forensics
- Malware analysis
- Firewall and proxy team
- Endpoint protection

Who is in Your Extended Family

People and Groups

Who is part of your extended family?

- Helpdesk
- Network services
- Security architects
- Human Resources
- Legal
- Public Relations
- Crisis Communications

Who are Your Clients

People and Groups

Who are your internal and external clients?

- **Business unit leaders**
- **Business partners**
  - Vendors, dealers, suppliers, contractors
- **Unions?**

What Other Agencies Are Involved

People and Groups

- **Law enforcement**
- **SEC, FCC, FTC, other TLAs**
- **CERTS**
  - Force muliplier
  - Information clearing house
  - Additional monitoring and threat intelligence source

Information Technology

People and Groups

Working with IT may be a special case, and special challenge

- **May own much of the infrastructure and budget**
- **Different definitions of “incident”**
- **Business continuity and 99% uptime at odds with IR**
- **Metrics may not align**

Chain of Command

People and Groups

- Who supports you?
- Who can tell you what to do?
- Who can you tell what to do?
- Who do you need to communicate with?
- Who do you need help from?

Train Everyone

People and Groups

- **External training**
  - (e.g. SANS)
- **Internal training**
  - Tabletop exercises
  - Class or conference summaries
- **What is common to all team members**
- **What is specific to certain team members/roles**

- **Train your organization (aka your sensors)**
  - User security awareness
  - What to report, when, and how
  - Policy – BYOD, use of corporate resources, etc

Tying It All Together – The SOC

People and Groups

- **Structure**
  - IR, malware, forensics, threat intelligence, …
  - What services are in, what services are out
- **Centralized or global**
- **All hazards**
- **Staffing**
  - Team composition
  - 8-5 or 24/7

Know Your Data

Planning and Preparation

- **Know your data, where it is, where its been, its value, ...**
  - Where it lives
  - How it moves
  - What is its value
  - Who values it
  - Know how to protect it at rest and in motion
  - Know how to monitor it

Resources Required - Technology

Planning and Preparation

- Ticketing systems
- Documentation systems
- SIEM
- Network and host monitoring tools
- Investigative tools – forensics, malware, ediscovery
- Laptops, desktops, screens, write blockers, ….
- Out of band communications

Resources Required – Physical Space

Planning and Preparation

- Normal work areas
- Abnormal work area - War Room
- Forensics lab
- Evidence storage
- Server room
- Whiteboards, displays, projectors, phones

Resources Required – Logistics

Planning and Preparation

- Credit cards, and permission to use them
- Hotels, travel arrangements
- Catering and kitchen facilities
- Comp time, overtime, flex time, play time
- Remote teams and/or partners
- Remote tools

Resources Required – Data

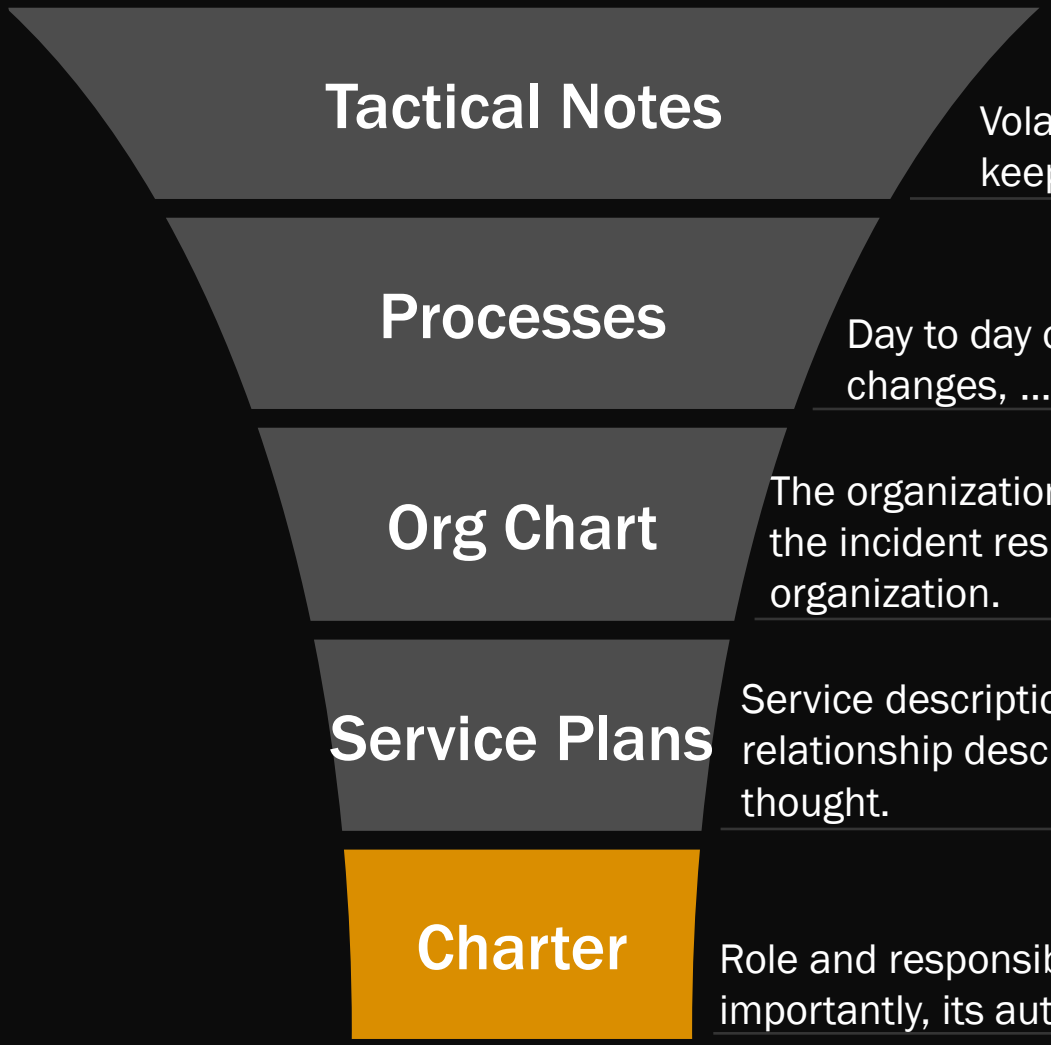
Planning and Preparation

Know and document your environment

- Asset database
  - Host to user or group
  - For fixed assets, device to physical location
- User database - user to role, business unit, location
- Network devices –
  - IP database - DHCP, DNS - IP to host
  - Bandwidth, protocols, services

Critical Documents

Critical documents and their volatility



Volatile information, everyone responsible for keeping current, kept in a wiki or SharePoint

Day to day operations, lab management, firewall rule changes, …. Monitor and update regularly.

The organization of the incident response team as well as the incident response team's place in the larger organization.

Service descriptions, high level delivery plans, and business relationship descriptions. Should only change after much thought.

Role and responsibility of the incident response team. Most importantly, its authority to act. Not subject to change.

Keep It Simple, Keep it Up to Date

Documentation

- **Have a plan, keep it up to date.**
  - If you cannot keep a complex, overly detailed plan up to date, start high and simple
  - As your organization matures, so will your plans
- **You will need detailed plans to be mature, if only because the business process around you is mature and wants details from you**
- **If you get too detailed, your plans will rapidly stop reflecting reality and will also be much more difficult to keep up to date**

Why Written Plans are Important

Documentation

- When something goes wrong, you don't want to be asked "Why didn't you follow the plan?"
- Good for delegating or involving outside resources
- Good for onboarding new staff
- Good for "I've been awake for 36 hours, am out of coffee, and just got another incident."
- Good for diplomatically telling someone that their request is out of scope

Other Documentation Thoughts

Documentation

- Don’t redefine terms
- Use plain English (or German, or Arabic, or ….)
- Use clean, informative graphics
- Create templates for common reports
- Nothing goes according to plan, so Sempre Gumbi

Severity Levels

Documentation

- **Best used to frame discussions and do triage**
- **Do not get bogged down in detail, many variables are too hard to calculate**
- **Items to consider:**
  - Number of systems compromised
  - Confidential or sensitive data
  - Reporting requirements
  - Mission critical systems
  - Resources available

Metrics

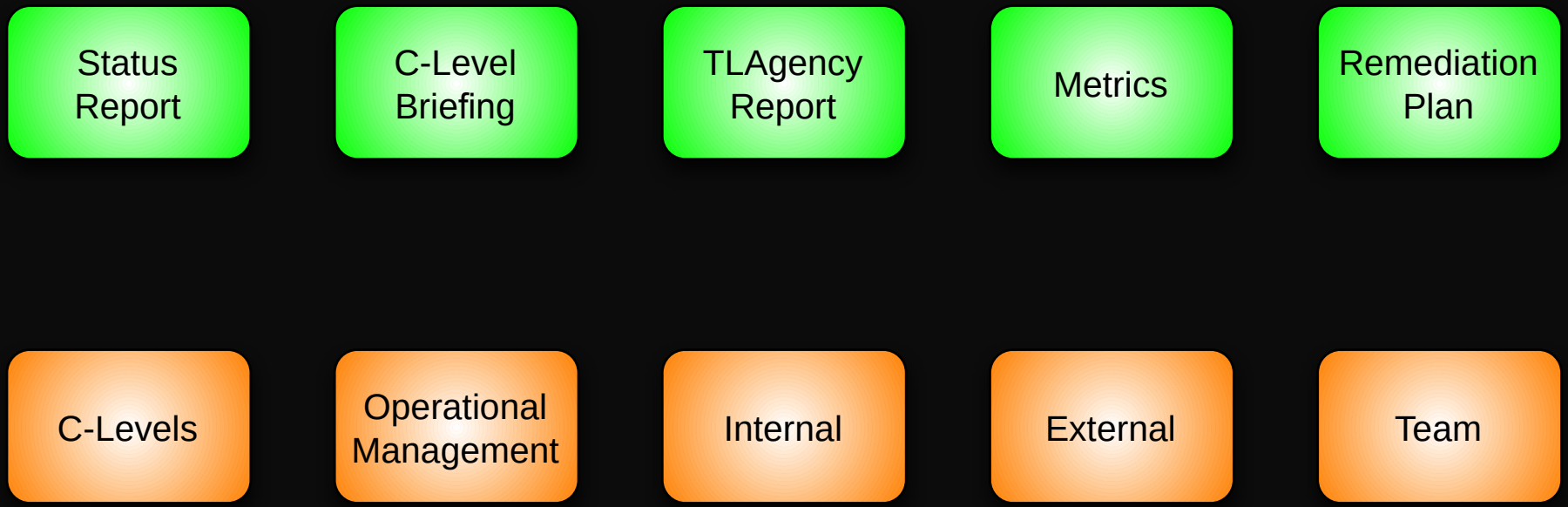
Documentation

You cannot manage what you cannot measure

- **Good for concise, regular communication upwards**
- **Tune metrics to stakeholders**
- **Metrics should be actionable**
- **Bad if "gamed" – Metrics will define your operations**
- **Possible metrics**
  - Number of incidents
  - Number of malware samples submitted
  - Time to detect
  - Time to remediate

Keep Reporting In Mind

Keep Reporting in Mind



The Big Picture

Monitoring

Monitoring should be done as soon as possible.

- It doesn't need to cost a lot
- It helps you answer other questions (e.g. tools to use)
- It provides actionable data now
- It doesn't depend on many other factors
- It adapts to a dynamic environment, which any network is
- Setting it up teaches you about your environment

You can't tell what is going on in your network without monitoring

You cannot tell if your controls are working without monitoring

What to Monitor - Host data

Monitoring

- Antivirus
- SCCM
- Event logs
- Registry changes
- New services

What to Monitor - Network data

Monitoring

- Event, content, full session, statistical
- IDS
- Netflow
- Firewall
- Proxy

What to Monitor - Application data

Monitoring

- Active directory
- Web server and web application logs
- Source code repository access logs
- Database logs

Users are Sensors - Internal

Monitoring

Internal Users

- Email
- Phone
- Trouble tickets
- Hallways

Users are Sensors - External

Monitoring

External Users – Joe Blow, TLAs, business partners …

- Email
- Phone
- Blogs
- Pastebin
- Shodan HQ
- Conferences
- Social media

Monitor the Monitors

Monitoring

- Security of monitoring systems
- Health of monitoring system
- Testing the monitoring system
- Access and ethics

Continuous vs. Security Monitoring

Monitoring

- **Continuous monitoring**
  - Big in .gov and NIST
  - Monitoring for vulnerabilities
- **Security monitoring**
  - Identify activity that may indicate malicious behavior

Process vs. Hunting

Monitoring

- **Monitor via process**
  - Indicators of compromise
  - Honeypots
  - IDS alerts
- **Hunting - incident discovery**
  - Let analysts go look for stuff that is of interest to them

Bring Your Own Devices

Monitoring

- **Legal**
  - What can you legally watch and collect
  - Get this addressed early and in writing
  - Keep pushing for more access
- **Device**
  - What can you require for endpoint security
  - Access to logs
  - Lots of noise, unknown default state
- **Network**
  - Often wireless, harder and easier to monitor

Lessons Learned & Threat Intelligence

Monitoring

Need to keep monitoring environment current

- Fold in threat intelligence
- Add lessons learned from after action
- Engage with security architects to bake in monitoring

Big Picture
Investigate

- **The Questions that Must Be Answered**
  - Who, what, when, why, where, how
- **Scope Determination**
  - Monitor and update
- **Root Cause Analysis**
  - May not be necessary every time

Triage – How Bad, What Next

Investigate

- **Very quick process**
- **Validate, investigate, escalate**
- **Define and use severity levels to guide triage process**
  - How bad is it
  - What is the indicator
  - Adjust over time
  - Helps with resource allocation

What Happened, and is Happening

Investigate

- Network – FOR572
- Host – FOR408, FOR508
- Malware – FOR610

Threat Actors and Attribution

Investigate

- Do you really need attribution
- How do you investigate threat actors and indicators
- No SANS course … yet
- pDNS, VirusTotal, Google, CRITS, ….

Stop The Bleeding

Containment

- **Short Term**
- **Long Term**

Keep It From Spreading

Containment

- **Business Consideration**
- **Communications**
- **Monitoring**
  - You know what to look for now
- **Contain vs Investigate**

Return Affected Systems to Normal

Remediation

Technically simple, logistically complex

- Execution plan
- Tactical vs Strategic
- Secure Communications
- Resources Required
- Scheduling
- Mini D-Day

Post-Remediation

Remediation

- **They're trying to get back in**
  - You have some indicators
  - Unlikely that they will go with 100% new TTP
  - Heightened state of awareness
  - Remember kill chains
- **Monitor completeness of remediation efforts**

When Do You “Call” the Incident?

Closing Incidents

- **Positive closure**
  - Don’t let it just fade out
  - Don’t call it because something else came up
- **Positive hand off of lessons learned**
- **Closure with all involved partners**
- **Expectations met, or reset**
- **Not over until the documentation is done**

Lessons Learned

Closing Incidents

- No fault, open discussion
- As close to end as possible
- Review CIRT documentation and update
- Update threat intelligence
- Update monitoring systems
- Positive hand off of lessons learned

Documentation

Closing Incidents

- **What documents do you need**
- **How much time and effort for documentation**
  - What expectations are you setting
  - Value of templates

Business Case for Incident Response

Who Is Involved?

- Preparation – involves the entire organization
- Identification – CIRT, IT, and business unit
- Contain – CIRT, IT, and business unit
- Eradicate – CIRT and IT
- Remediate – CIRT, IT, and business unit
- Lessons learned - involves the entire organization

Business Case for Incident Response

- **Metrics**
- **Cost of an incident**
  - Be careful if you calculate or report this

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