Fighting the APT: Intelligence, Analysis, and User Awareness

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Approved for Public Release; Distribution Unlimited. 13-1513

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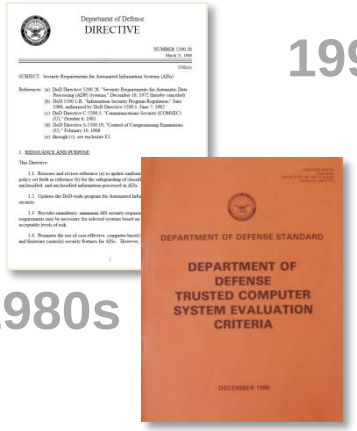
30 Years of Information Assurance Different Areas of Focus, Same Model

Reduce the Attack Surface

Reduce the Attack Surface

1980s

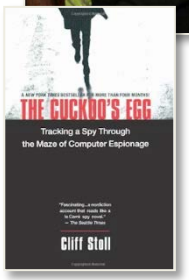


Focus on protecting operating systems

DoD 5200.28-STD

- Trusted computer base
- Least privilege

1990s



Focus on firewall technology

- Consolidate internet presence
- Proxy internet traffic
- Minimize ports & protocols

2000s

SATAN

Focus on vulnerability assessments

- Know your network
- Find your vulnerabilities
- Patch management

Today

Focus on mitigation and compliance

- FISMA → Continuous Monitoring
- Consensus Audit Guidelines 'CAG 20'

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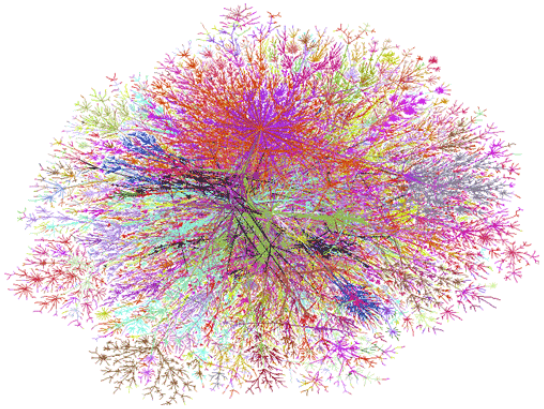
What We've Learned

Reducing attack surface really hard – maybe impossible

- **Networks too large and complex**
- **Zero vulnerabilities for all assets on network?**
  - **Assumes you know all assets**
  - **Assumes you can know all vulnerabilities**



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NEW Approach

A traditional information assurance approach based solely on regulation, which resulted in an approach based on mitigation and compliance around static defenses

To a threat based cyber defense that balances Mitigation with Detection and Response

- Defenders become demanding consumers of intelligence
- Producers of intelligence

Characteristics of the Threat

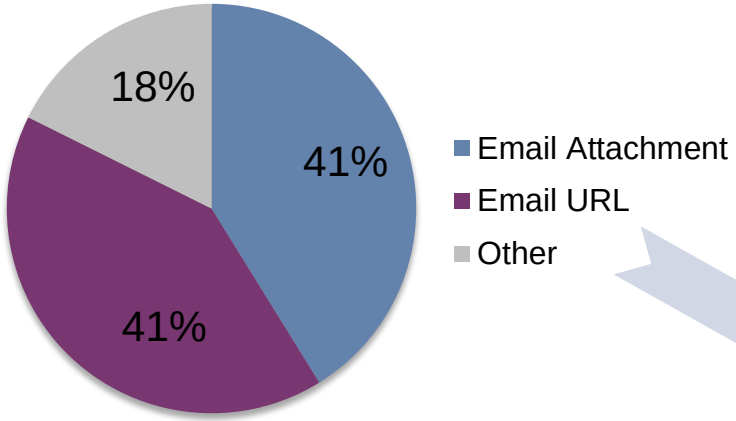
1. **We won't always see the initial attack**
2. **We can't keep the adversary out**
3. **Advanced Persistent Threat is not a "hacker"**

Attributes of a Top-Notch Cyber Program Today

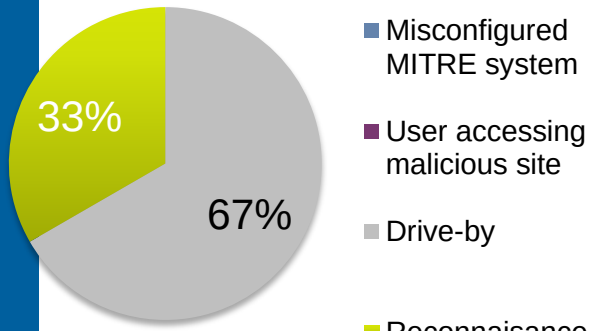
1. **Cyber Intelligence Program**
   - Rich set of sources
   - Disciplined Indication and Warning process
   - Good understanding of threat actors in your sector
2. **Quality Malware Analysis Program**
   - Large repository of samples which extracts unique signatures
   - Works with larger malware community
3. **Development team working side-by-side with operators (DevOps)**
4. **Incidence response “baked into” defensive posture**
5. **Workforce culture of “cyber aware”**

Advanced Persistent Threat (APT)
How do they attack?

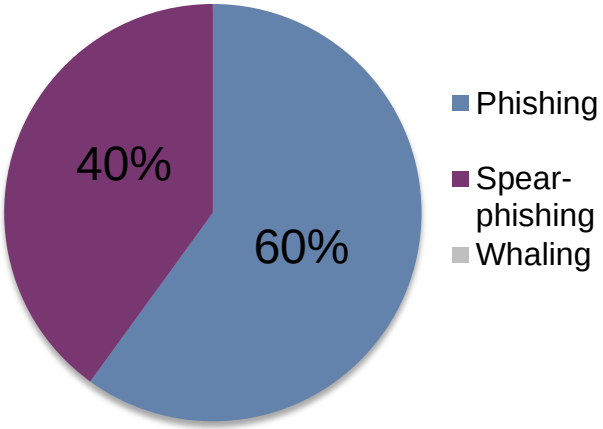
Attack Vectors



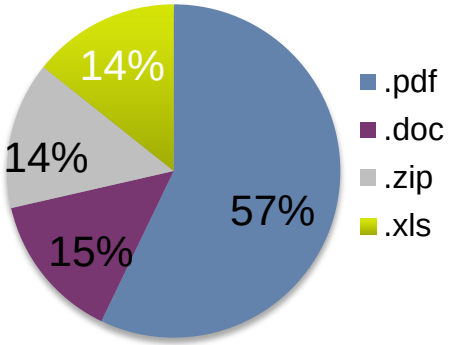
Other



Social Engineering Technique



Attachment Payload



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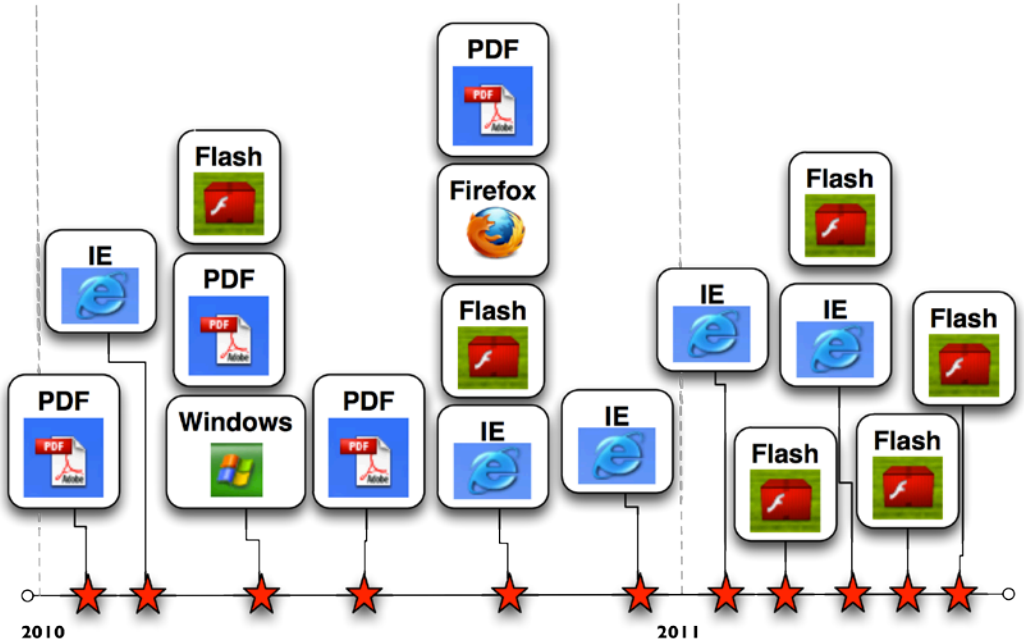
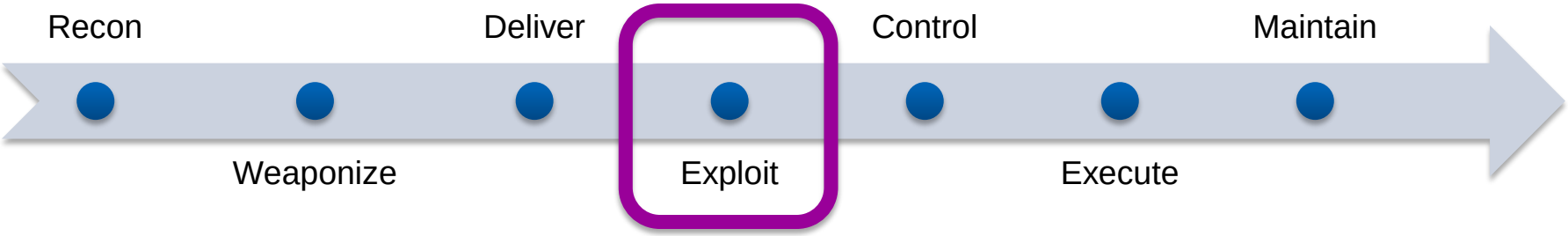
Scanning and Patching Isn't Enough

- **0-day Exploits**
  - Ave. patch time: 30 days
  - Ave. 0-days per year: 8
  - Exposure: 240 days per year
- **Best-practice patching**
  - 90% patched within 72 hours
  - Exposure : > 65% of the year





Cyber Attack Lifecycle

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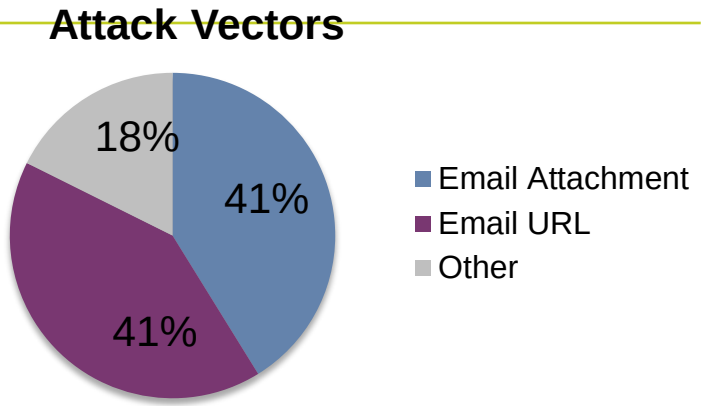
Tools and Sensors

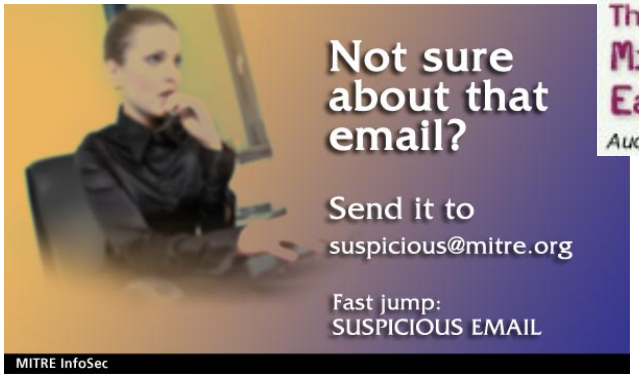
- **Centralized Log Manager**
  - Web proxy, Mail, DNS, etc. logs
- **Security Information and Event Management**
  - NetFlow analysis
- **Packet Capture and Analysis**
  - Malware extraction
  - Traffic analysis
- **Snort – Network Intrusion Detection System**
  - Intelligence derived signatures
- **RT - Trouble ticketing system**
  - Incident Response work flow and documentation
- **Desktop anti-virus**
- **Email gateway anti-virus**

User Awareness Practices

- **Motivation: Users are the biggest target**



- **Best Practices:**
  - **Repeated Targeted messaging; building a "Don't click" culture**
  - **Easy reporting: suspicious@mitre.org**
  - ***Personal Engagement* – 1-1 follow-up from suspicious email, proactively briefing frequently targeted users, follow-up on incidents, …**



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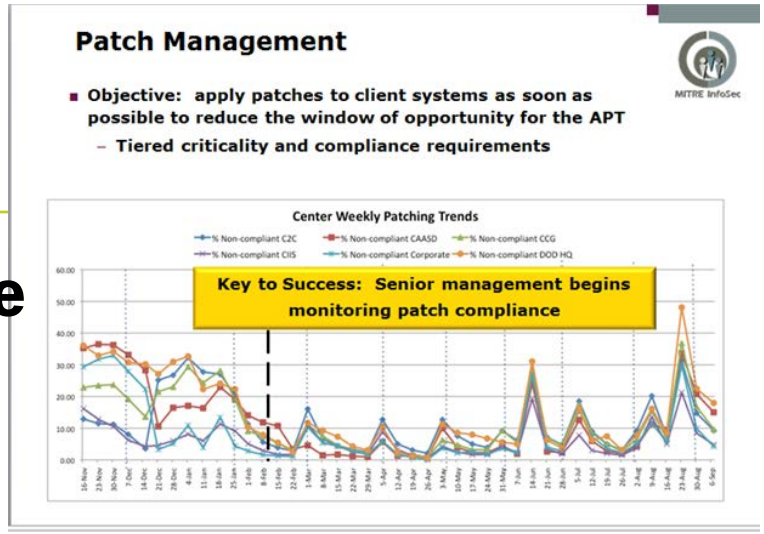
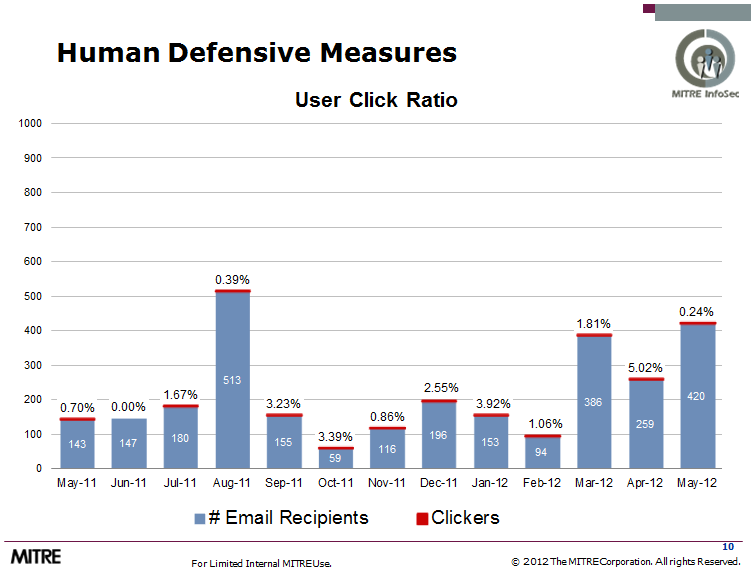
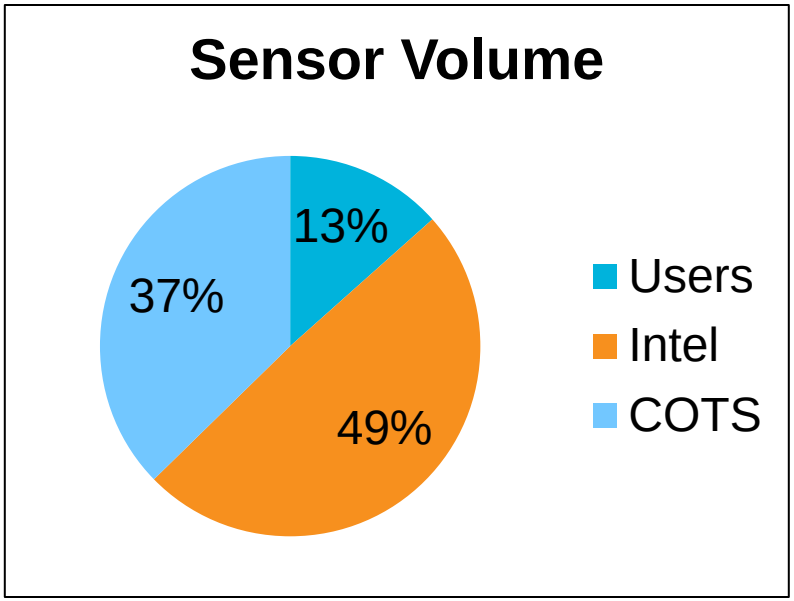
User Awareness Results

- Great patch response time
- Click rate
- Users as sensors







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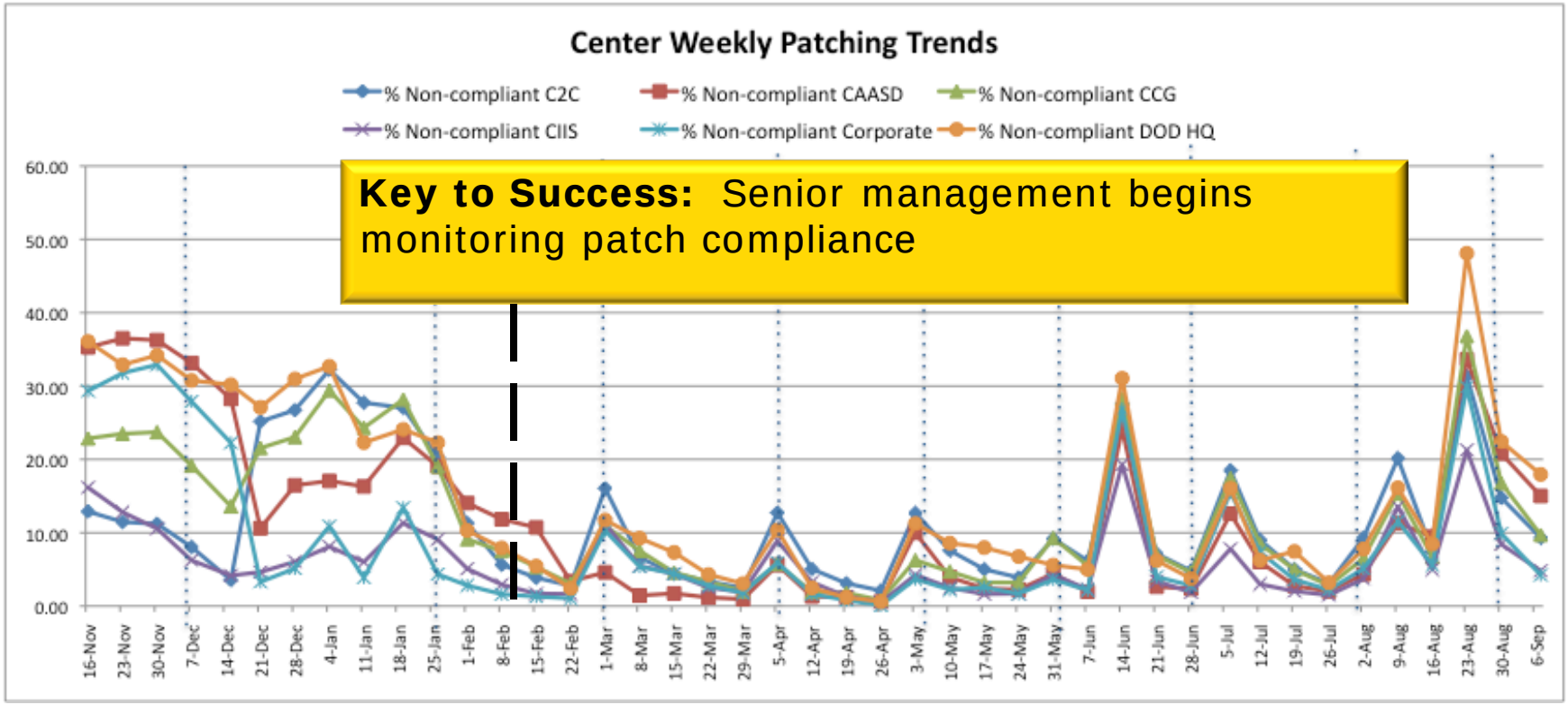
Patch Management

- **Objective: apply patches to client systems as soon as possible to reduce the window of opportunity for the APT**
  - Tiered criticality and compliance requirements



Key to Success: Senior management begins monitoring patch compliance

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Cyber Intelligence Business Case

- **Zero days exploits provide a window of opportunity for the APT**
- **COTS security technology is only partially effective against detecting APT attacks**
- **User reporting is not 100%**
  - The APT needs only one user to click

Other means of detecting and defending against the APT are needed
…
the mission of cyber intelligence is to bridge this gap

Key Elements of Threat-Based Approach

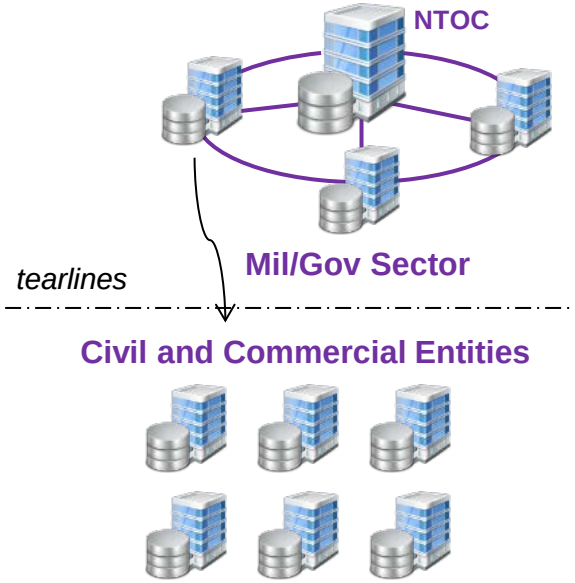
1. **Understanding of Threat Building Blocks**
2. **Effective Threat Sharing Model**
3. **Agile defensive posture aligned with threat**

Share Indicators and Tools, Not Outcomes

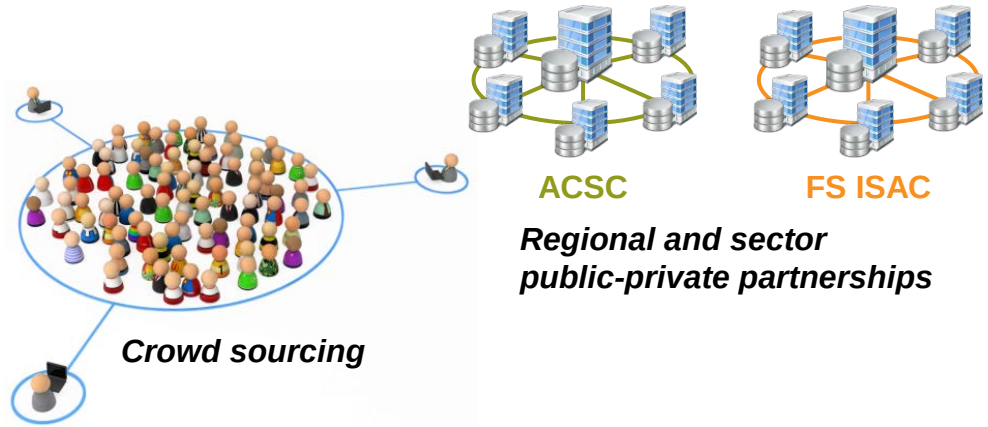
- **Early attempts focused on vulnerabilities, intrusions, and attribution**
- **Organizations resisted sharing**
  - Fear of embarrassment and liability
  - Classification constraints
- **Attribution is overvalued**
  - Not that important to response and mitigation
  - Can be relevant to understanding adversary TTPs

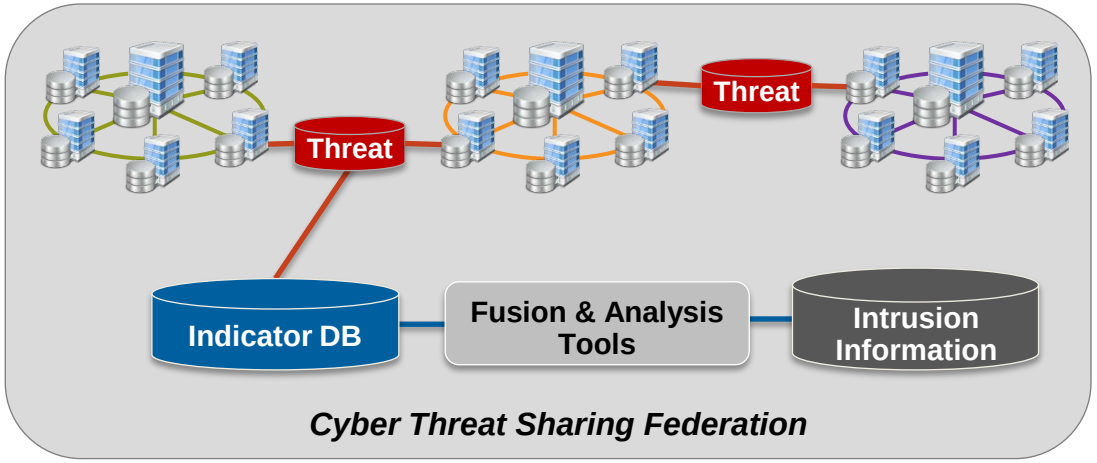
Evolve the Information Sharing Landscape Everyone Can Contribute

From government-led, top-down distribution



To new constructs





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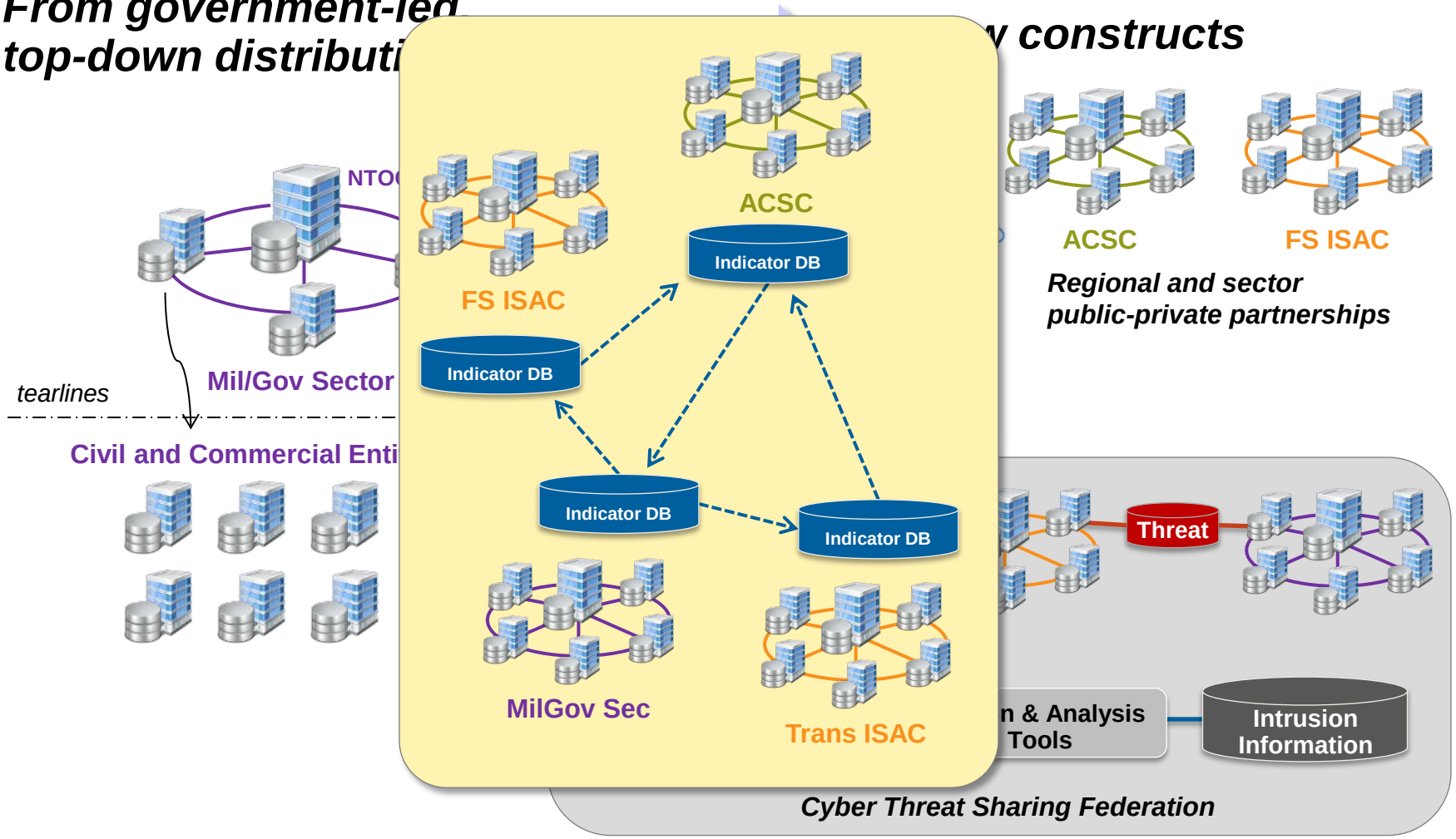

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Supported By Standards-Based Infrastructure

External Feeds of Threat Information

OSINT

DCISE

AV vendors

ISPs, MSSs

MITRE CRITS: Structured Threat DB

Sharing Partners

Internal Feeds of Operational & Analyst Threat Information

- Indicators
- Observables
- Incidents
- TTPs
- Campaigns
- Threat Actors
- Targets
- COAs

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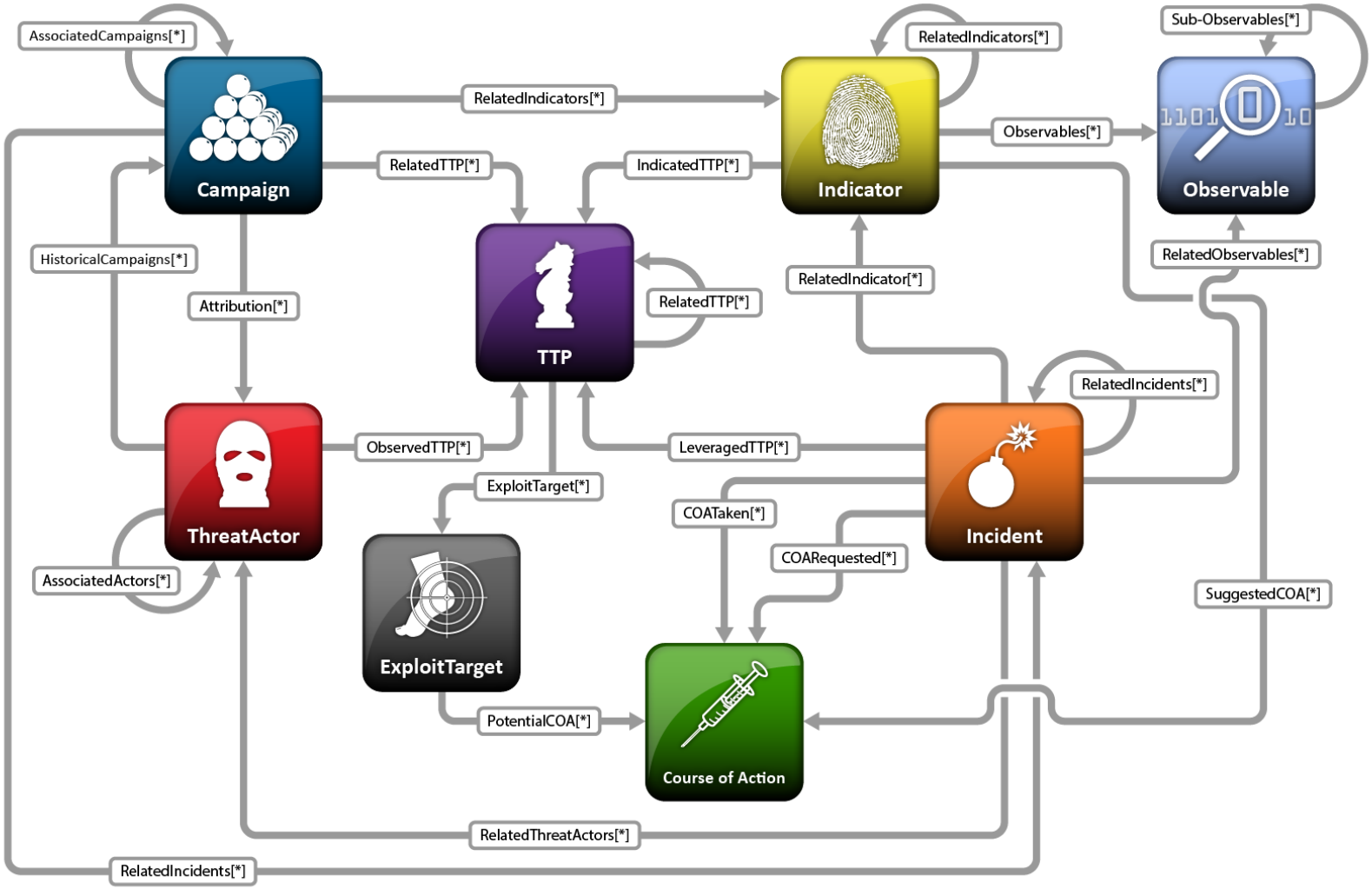
What is “Cyber (Threat) Intelligence?”

Consider these questions:

- What activity are we seeing? — Observable
- What threats should I look for on my networks and systems and why? — Indicator
- Where has this threat been seen? — Incident
- What does it do? — TTP
- What weaknesses does this threat exploit? — ExploitTarget
- Why does it do this? — Campaign
- Who is responsible for this threat? — ThreatActor
- What can I do about it? — Course of Action

Structured Threat Information eXpression (STIX) v1.0 Architecture



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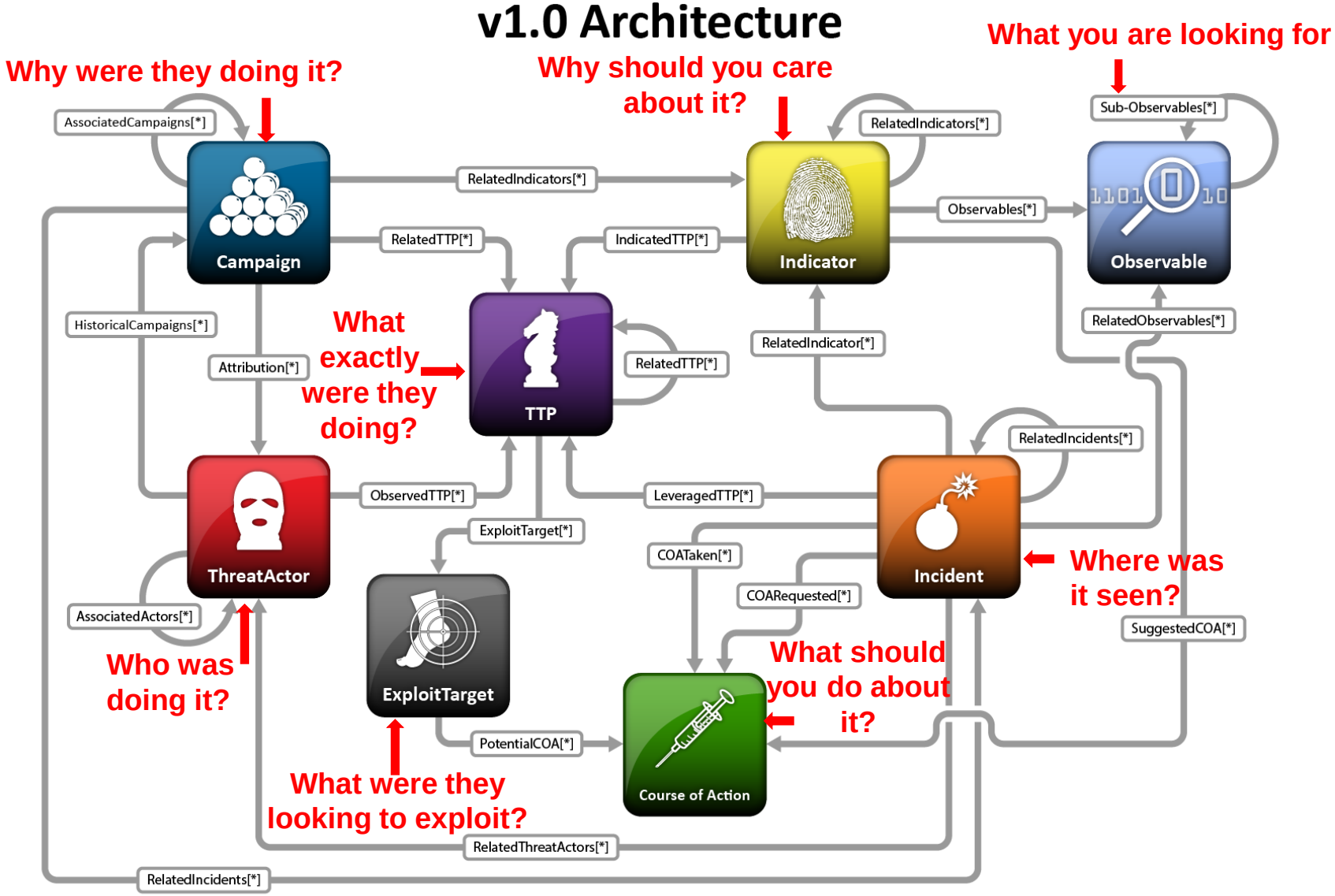

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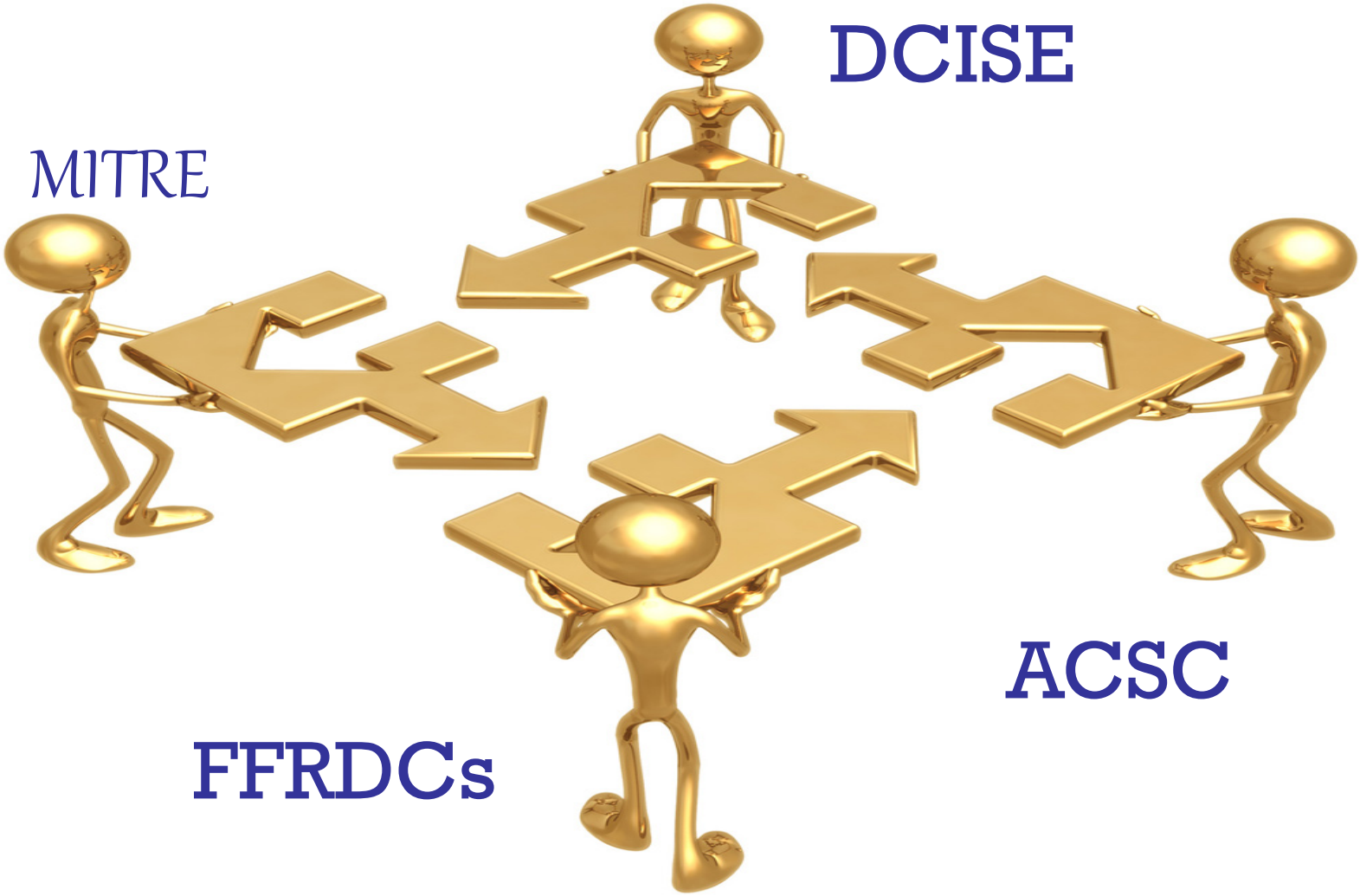
Partnerships



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Sharing knowledge of our opponents and watching the plays develop, we can make the saves that protect our **net**works.