# Cybersecurity for the Americas

## ITU Regional Event

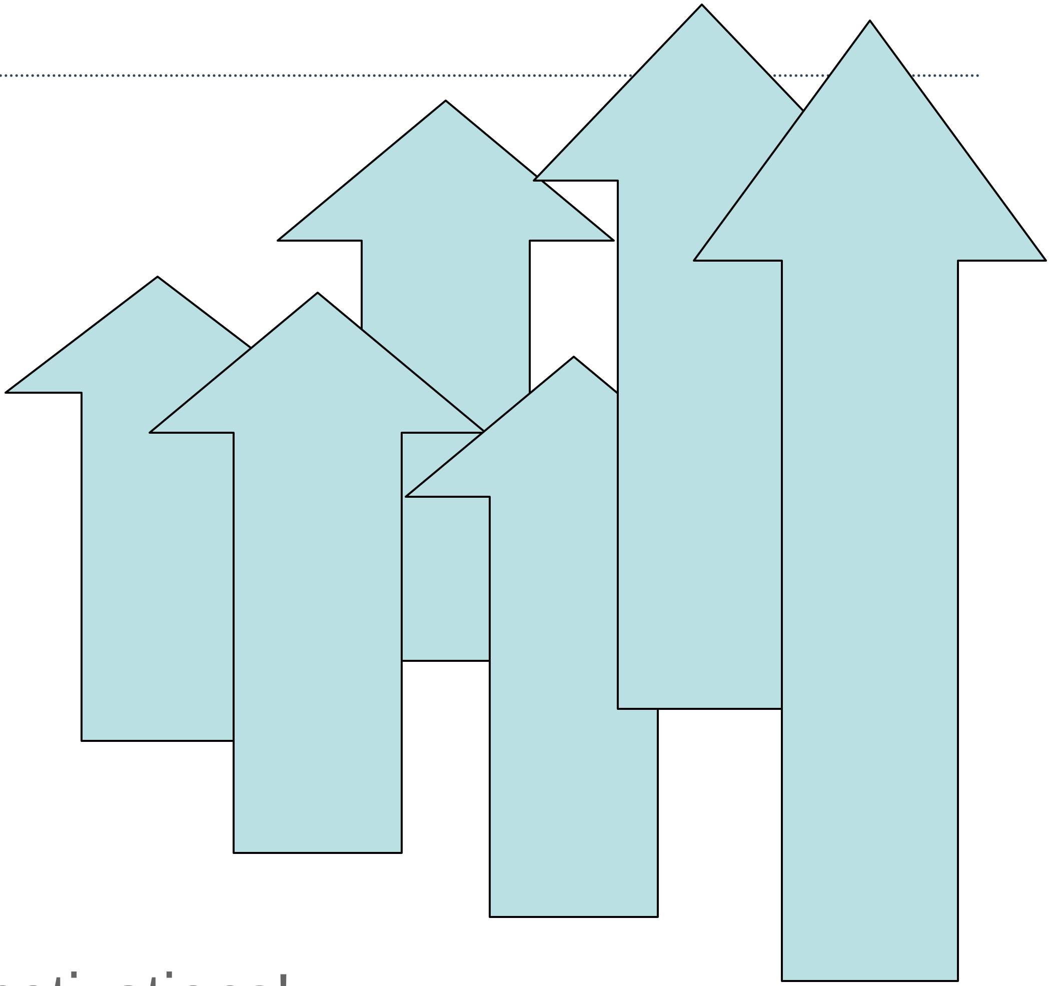
## “Connecting the World Responsibly”

Michael Lewis, Consultant to the ITU

ITU International Telecommunication Union

Indotel

# Recall the Trends



- Users on Internet
- Computers
- Devices
- Core Applications
  - eGov, CII
- Vulnerabilities
- Exploits
- Financial Incentives
- Criminal Activity
- & consider political motivations!

# We have established in recent sessions that…

- IT systems have become fundamental to the effective functioning of core societal services (eGov, eHealth, eEducation, eCommerce, Energy, Communications, etc.)
- and are too important to fail, thus should be considered elements of our national critical infrastructure
- yet disruptions happen, often, for myriad reasons, some malicious
- so we must establish an effective capacity to detect and respond to incidents (such as the CSIRT model) at the organizational and national levels, and coordinate this effort
- and learn from the experience to diminish the number and significance of future incidents

# And further agreed that …

- Cyber Security is important enough to receive dedicated personnel and resources
  - Rather than “oh, and you guys should do security, too”
- A CSIRT can exemplify and propagate high-level policies and best practices
- It can formalize incident response and capture “lessons-learned” to improve policies and procedures
- It establishes responsibility, accountability, “accredited” points-of-contact, and reliable communication channels

Sort of a “Ghostbusters” for cyber incidents

# Range of Services

## as per the SEI of CMU

### Reactive Services

- Alerts and Warnings
- Incident Handling
  - Incident analysis
  - Incident response on site
  - Incident response support
  - Incident response coordination
- Vulnerability Handling
  - Vulnerability analysis
  - Vulnerability response
  - Vulnerability response coordination
- Artifact Handling
  - Artifact analysis
  - Artifact response
  - Artifact response coordination

### Proactive Services

- Announcements
- Technology Watch
- Security Audit or Assessments
- Configuration & Maintenance of Security Tools, Applications, & Infrastructures
- Development of Security Tools
- Intrusion Detection Services
- Security-Related Information Dissemination

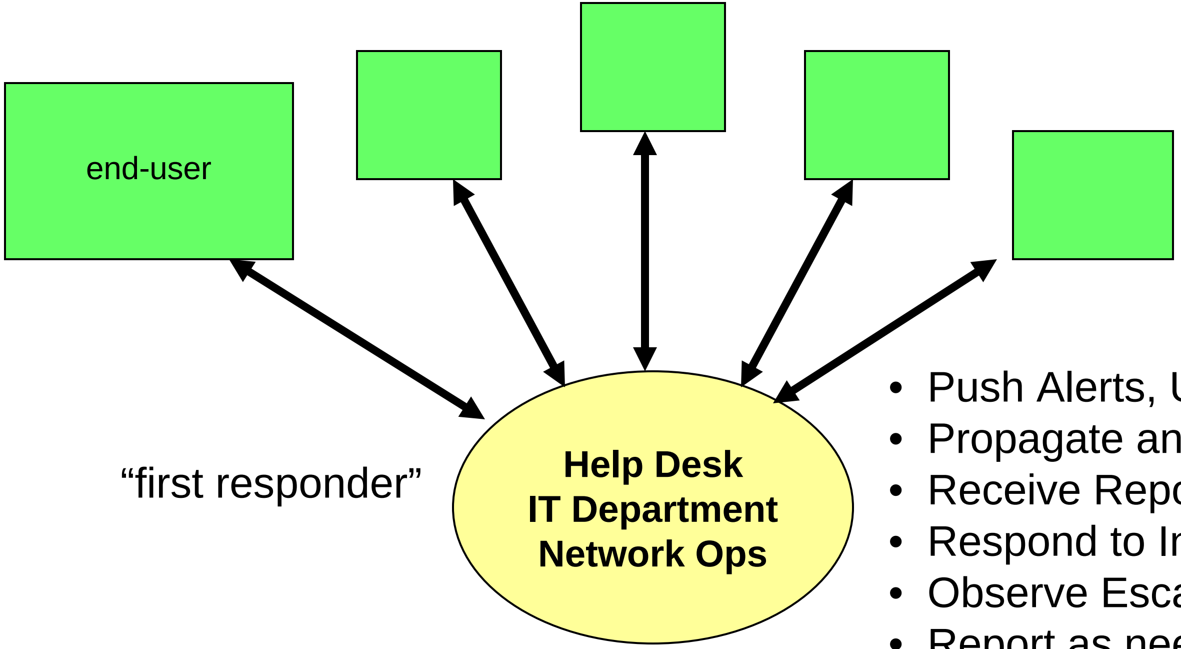
### Security Quality Management Services

- ✓ Risk Analysis
- ✓ Business Continuity & Disaster Recovery Planning
- ✓ Security Consulting
- ✓ Awareness Building
- ✓ Education/Training
- ✓ Product Evaluation or Certification

Any given CSIRT is likely to implement only a subset of such services

# An Organizational CSIRT

Who do they call?



"first responder"

- Push Alerts, Updates, Patches
- Propagate and Enforce Policies
- Receive Reports
- Respond to Incidents!
- Observe Escalation Procedures
- Report as needed to national center

## "Front-Line" Response

to formalize "internal" incident response

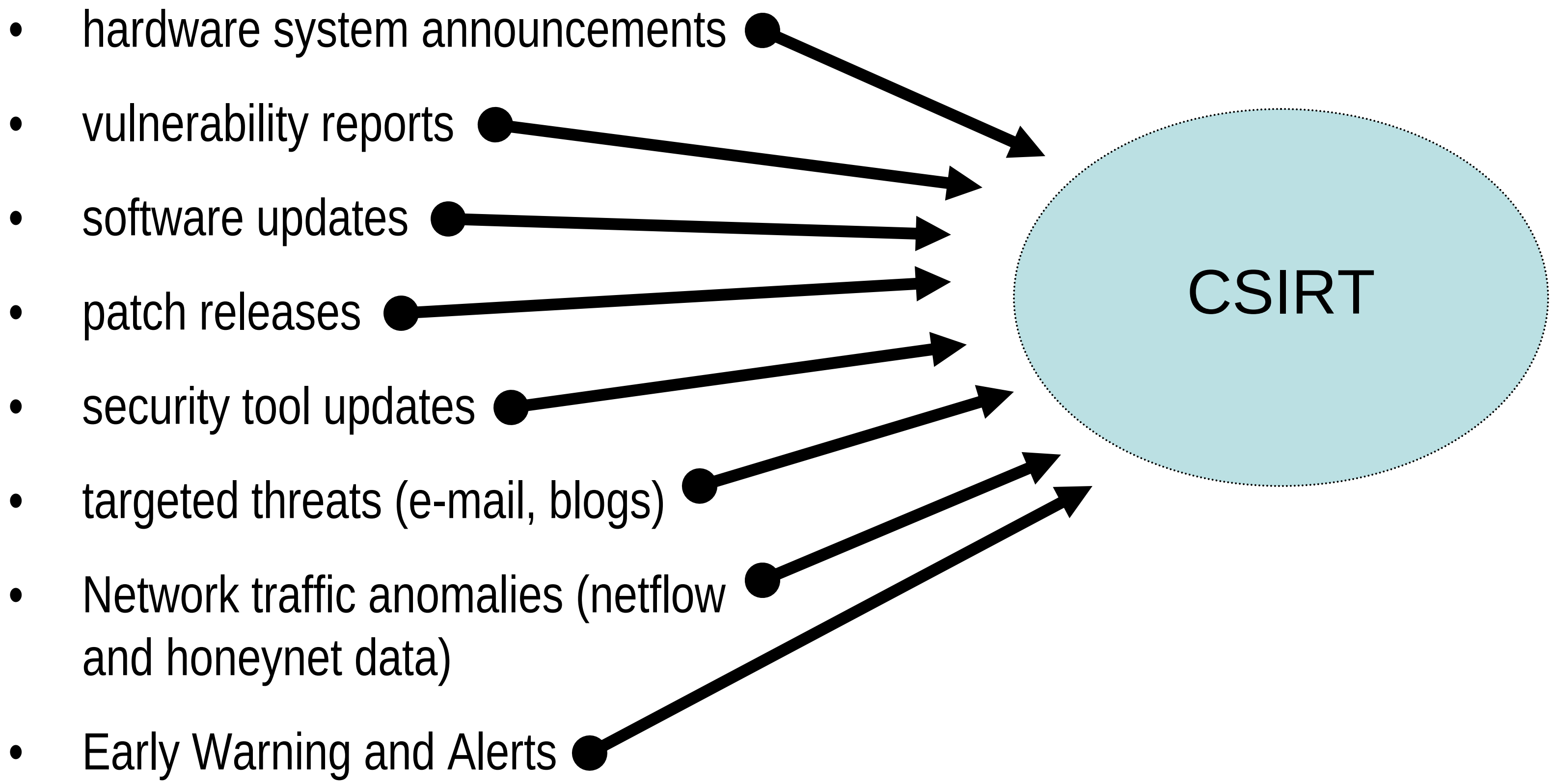
Note the "Forum of Incident Response and Security Teams"

# The Incident Response component of a CSIRT could include:

- **Watch** – to monitor threats & vulnerabilities, and assess relevance and risk
- **Warning** – to disseminate validated threats to at-risk constituents
- **Investigation** – to analyze how an incident occurred, for technical and possibly legal reasons
- **Response** – to detect and mitigate potentially disruptive incidents

# Watch

## Monitor Inputs

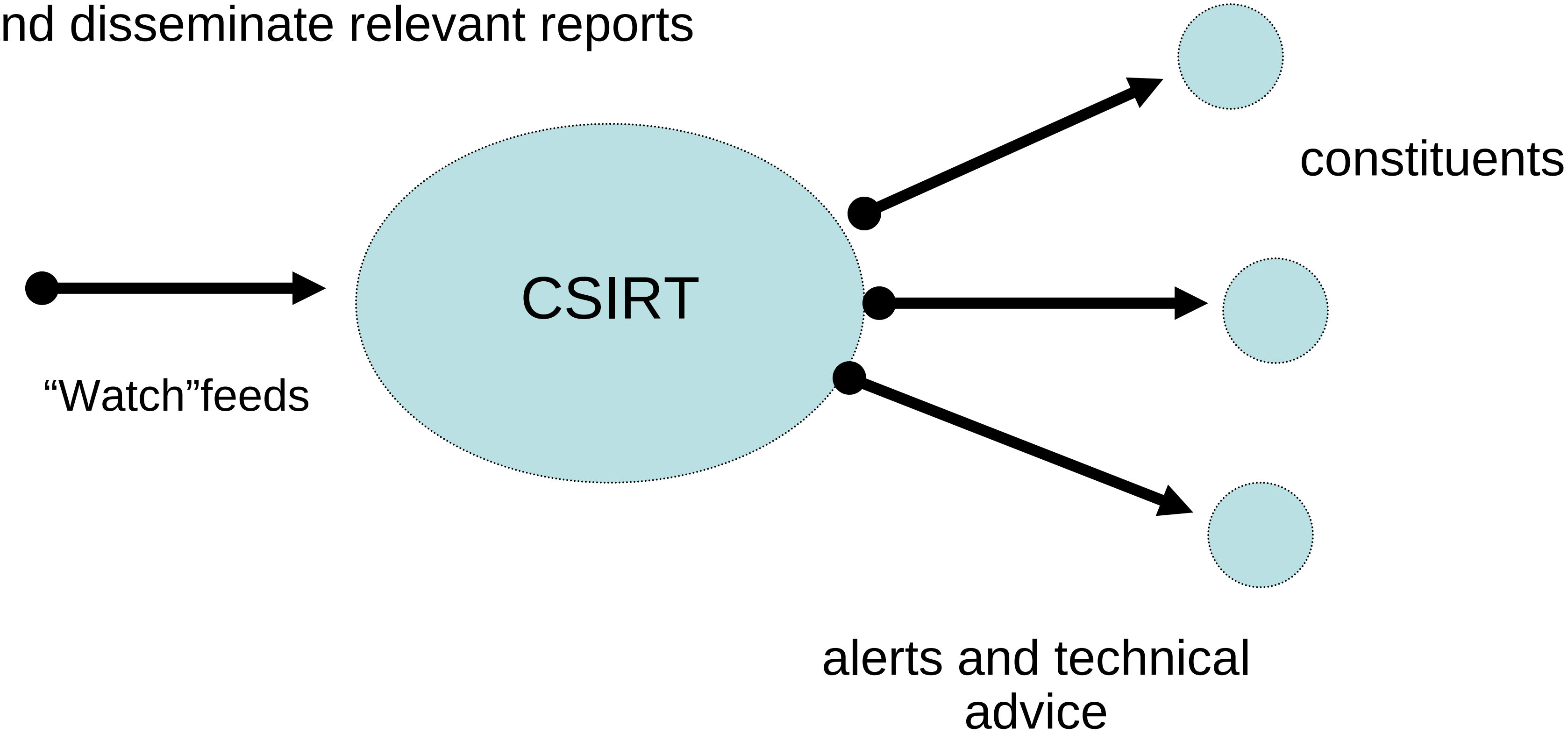


- hardware system announcements
- vulnerability reports
- software updates
- patch releases
- security tool updates
- targeted threats (e-mail, blogs)
- Network traffic anomalies (netflow and honeynet data)
- Early Warning and Alerts

CSIRT

# Warning

Assess and filter “Watch” inputs
and disseminate relevant reports



CSIRT

“Watch”feeds

constituents

alerts and technical
advice

# Investigation

- Gather and review the “artifacts” of an incident
- Review timeline and sequence of events
- Analyze factors that contributed to the incident
- Identify system vulnerabilities that enabled the incident
- Provide specific feedback to improve systems and reduce future risk
- Consider whether the incident is criminal in nature, and potentially involves engagement with law enforcement

# Response

## initial

- Who do they call?  Set up an incident reporting hotline
- Train the first-responder(s)
  - systematic data collection and preservation
    - Get it right the first time!
  - discretion and non-provocation (!)
  - handling of sensitive information
  - event “triage”
- Route the request, as per tech assessment & priority
  - May involve calling on back-stoppers!
- Escalate, as per thresholds
  - potentially involving a national or global reporting center

# Response

## additional considerations

- Provide topical advice and timely assistance
  - but do not speak beyond your expertise
  - and don’t promise what you can’t deliver!
- Minimize the damage – and do no further harm!
- Preserve and protect artifacts
  - And do so in a forensically-safe manner
    - incident response will often change the state of the system, thus interfering with later analysis
- Restore systems

# When an Incident is Detected …

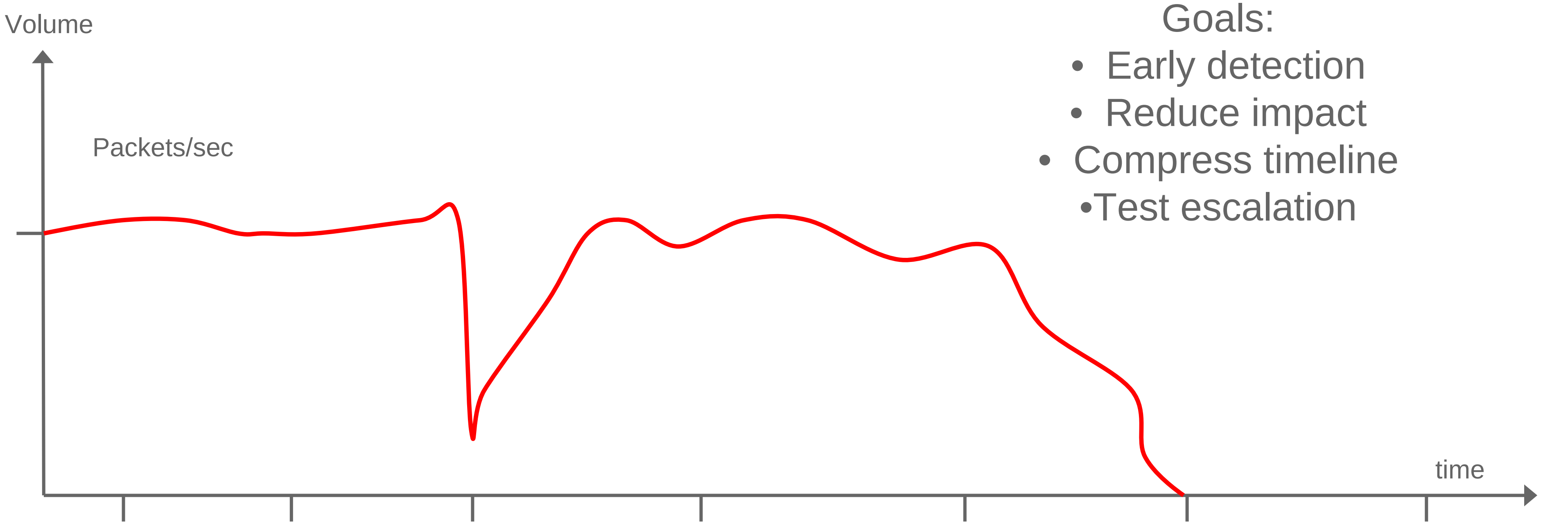
- Do people know what to do in a crisis?
  - Would they recognize an incident when it happens?
  - Who would they contact to report or request assistance?
- Are roles defined?
  - Issues of authority, responsibility, & liability
- Do trusted relations exist?
  - Must be established in advance of actual need!
- Such questions should be asked at all levels, in advance
  - Individual
  - Organizational
  - National

# General Questions re Incident Response

- Are first-responders identified and properly trained?
- Are there “default” authorized responses that can be designed in advance and rapidly deployed for different types of incidents?
- If so, what is the “trigger” for activation?
- Are escalation procedures defined?
- Are forensically-safe mitigation and analysis methods available? And used?
- What are the respective roles and responsibilities of targeted site / ISP / CSIRT / law enforcement?
- Are there liability issues involved, regarding intervention and advice?

# Sample Incident

Genericized, simplified DoS incident attack traffic, over time



Goals:

- Early detection
- Reduce impact
- Compress timeline
- Test escalation

18:00 DDoS detected

21:00 Org Calls National Team

01:00
- Change IP
- ISP Filter

Discover attack
Is actively monitored

08:00
- TCP Dump

Data Collection

14:00 Start TCP dump data analysis

17:00 Apply Filtering Rules

ISP Data Collection and analysis

NYA3

# Post-event Review

## potential aftermath questions

- When did the attack stop?  When did it start?
- Was there a discernible pattern that might help future early detection strategies?
- Review the impact of mitigation strategies – what worked? What didn't?
- Review the sequence of deploying the mitigation strategies – was order important?
- What could be done to improve detection and response?
- Was the proper escalation procedure observed?
- Were the right partners involved?

Slide 16

**NYA3** Under Revision

Nora Yousef al-Abdulla; 08.06.2008

# Scenario (1)

- There is a Denial-of-Service attack taking place in a neighboring country
- The neighbor tracks a source back to your country
- Who would they call in your country for assistance?

# Scenario (2)

- There is an active Denial-of-Service attack against a major organization in your country
- You are able to trace a source back to a foreign country
- Who do you call for assistance?

# Scenario (3)

- The on-line payment processing web site for your organization has been compromised. Criminals have found a way to defraud the process, receiving goods and services but paying little or nothing
- It is a systemic flaw, not readily patched
- If you shut the site down, key services become unavailable
- If you continue, the fraud could increase
- Law enforcement would like the site to stay up, so as to continue the investigation
- Who makes the decision to close or stay open? Who is liable for the repercussions?

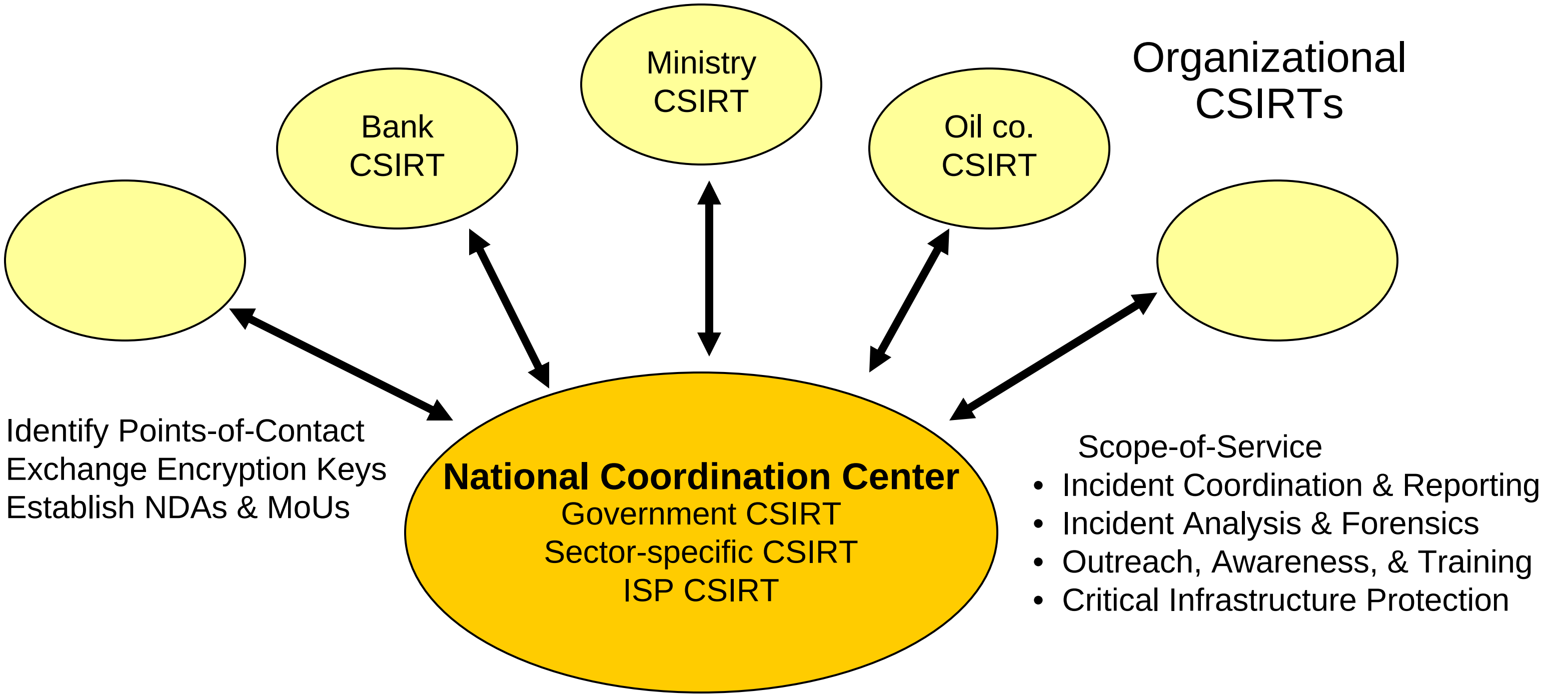
# Scenario (4)

- The local newspaper has heard a rumor about your compromised payment site.
- A reporter asks you to respond for an article that will be published tomorrow.
- What do you say?
  - “No comment”
  - “We are doing everything we can to shut this down”
  - “We take all measures to protect our system”
  - … or something else?

# Reminders ...

- Detect early – based on prior experience & domain exp.
- Facilitate reporting – make it easy, take it seriously
- Respond quickly, and consistently – build confidence
- Decrease the amount of time required, at every stage
- Fix the problem(s)!  And prevent recurrence
- Manage sensitive information - and be discreet!
- Confidence is hard-won and easily lost

# the National CSIRT model



Bank CSIRT

Ministry CSIRT

Oil co. CSIRT

Organizational CSIRTs

- Identify Points-of-Contact
- Exchange Encryption Keys
- Establish NDAs & MoUs

**National Coordination Center**
Government CSIRT
Sector-specific CSIRT
ISP CSIRT

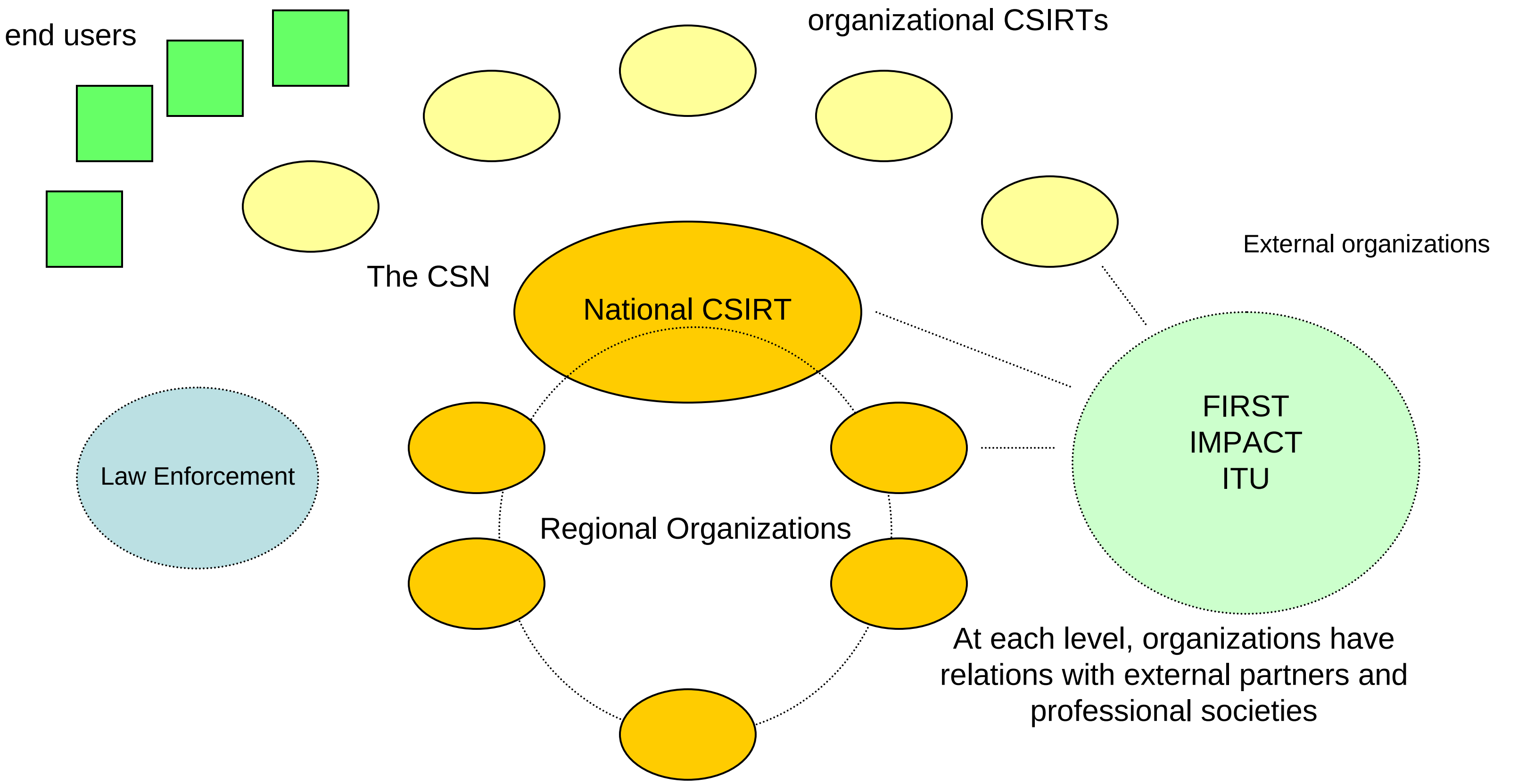
Scope-of-Service

- Incident Coordination & Reporting
- Incident Analysis & Forensics
- Outreach, Awareness, & Training
- Critical Infrastructure Protection

## A necessary but not sufficient component of a national cyber security strategy

Note the “CSIRTs with National Responsibility” working group

# Recall the Cyber Security Network



At each level, organizations have relations with external partners and professional societies

A community with complementary and reinforcing roles and responsibilities, from end-user up to the national level

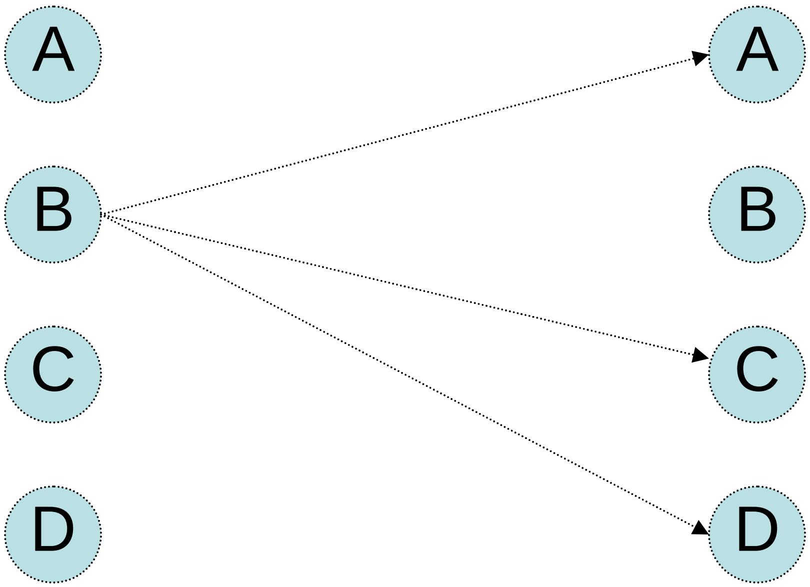
# Consider a set of organizations

## inside a country, or a group of national CSIRTs

and communication amongst them

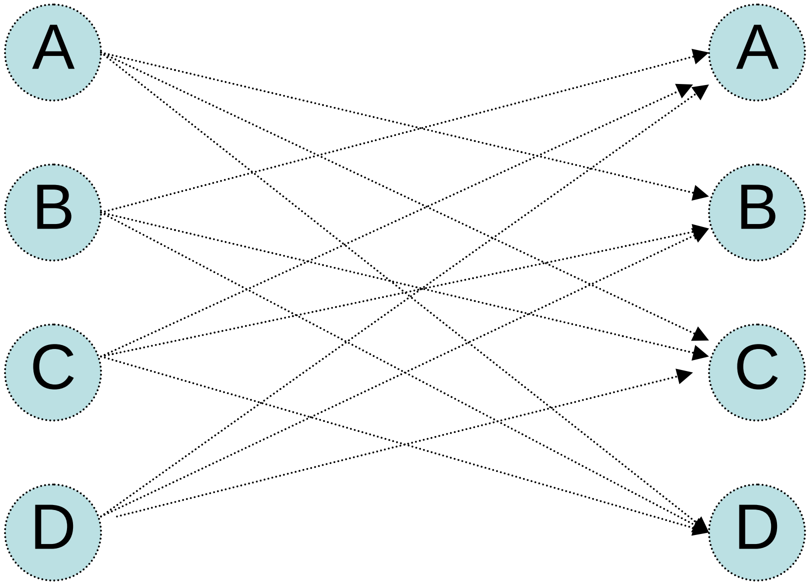
# Scaling of Points-of-Contact

… not so hard, with a handful of partners



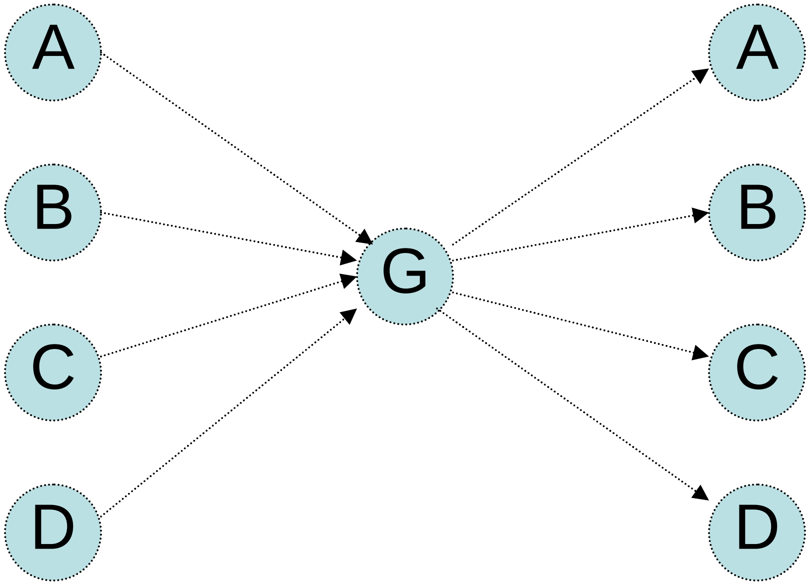
# Scaling (2)

but consider the number of bi-lateral connections … and how it grows with each new member



# Scaling (3)

…. And why the use of trusted intermediaries is an appealing option



Thus the motivation for,
say, national coordination
or Global Response Center!

# Questions?