Grid Security – An Introduction

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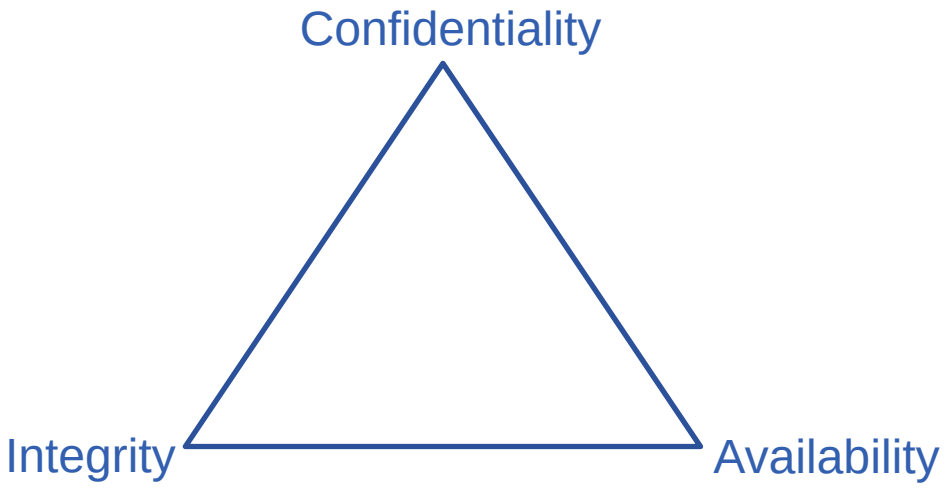
Information Security in the context of Grid Computing

Anything NEW?

Security Triad

- **Fundamental principle of security – AIC Triad**
- **Confidentiality**
- **Integrity**
- **Availability**



The “Unique” Challenges?

The “Unique” Challenges

- **Communication**
  - How to create and maintain a clear & up-to-date communication channel?
- **Blur Security Domain Boundary/Perimeter**
  - Transparent access to Grid resources
- **Security Monitoring at different levels (Site, ROC and Grid)**
  - Security events such as vulnerability, patch, log, scanning, attack and intrusion etc;
  - Balance of Privacy & Security – how to share sensitive information among sites, ROCs across the Grid?
- **Security Assessment/Audit**
  - Determine/verify that security controls are implemented correctly and operated as intended, but HOW?
- ... ...

The Risk?

The Risk

- **Attacks against other sites (ex: DDoS)**
- **Storage, distribution or sharing of illegal/inappropriate material**
- **Disruption of service, damage/lose of user data:**
  - Damage to the project/sites reputation;
  - Legal/financial actions against participants;
- **And more … …**

http://proj-lcg-security.web.cern.ch/proj-lcg-security/RiskAnalysis/risk.html

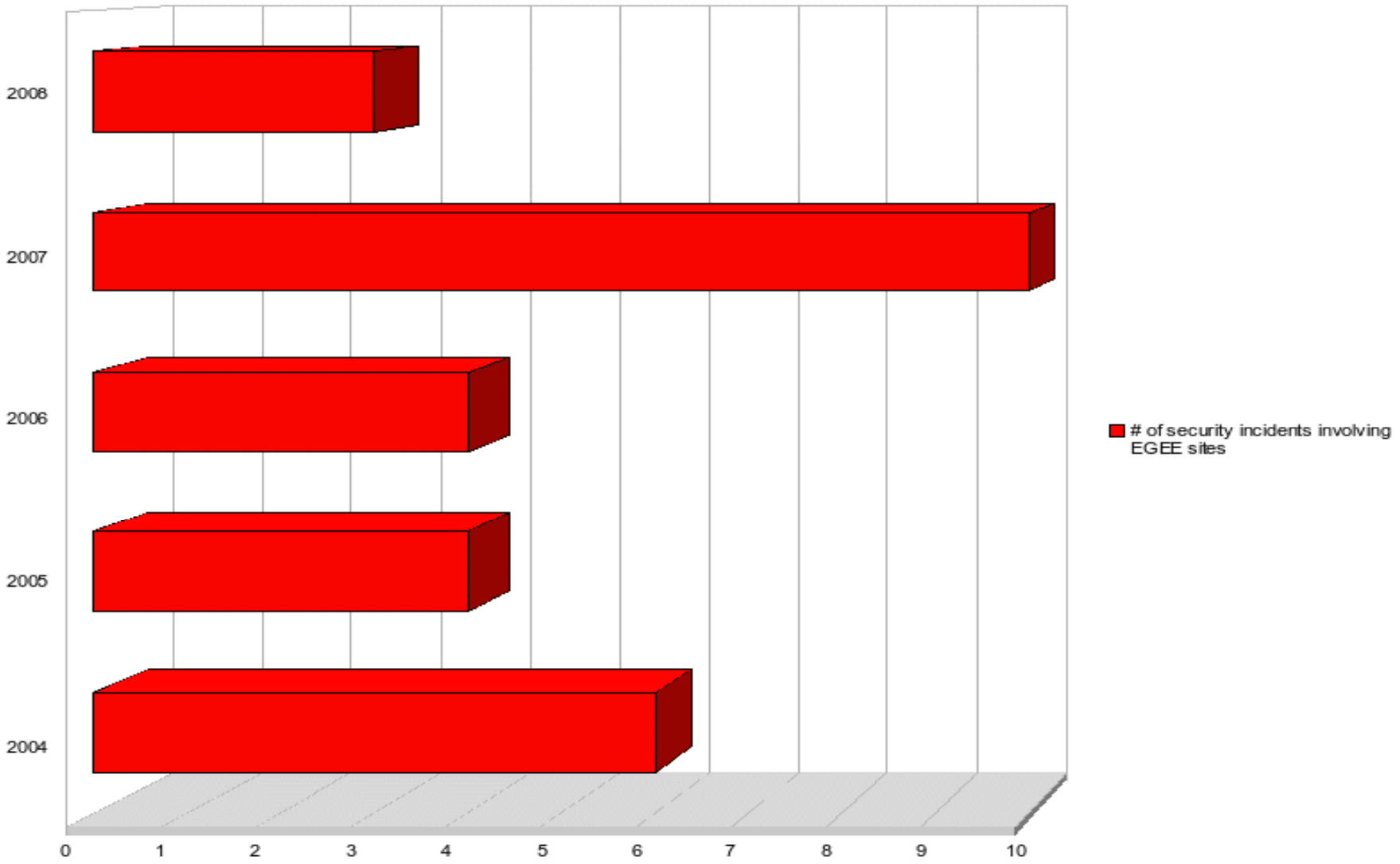
The Threat

- **Attacks from individuals**
  - motivated by fame, ego, self-satisfaction: scripting kids
  - Hacker for financial benefit or political motivation
- **Organised crime syndicate**
  - motivated by money
  - large-scale attacks
  - professional attackers
  - better-designed and smarter malicious code
- **Spams and Botnet is part of underground economy**
  - Top 11 Botnets sending SPAM (RSA conf, April 2008):
    - ~ 1 Million hosts
    - > 100 Billion SPAM emails per day
    - One SPAM message may be tied to up to 10 different organisations

The Grid

- **Grids are not (yet) a primary target**
  - Currently ADSL hosts are the easy/popular target (Botnets)
  - But this may change soon
- **Grids are valuable to attackers:**
  - **Large numbers of distributed hosts**
  - **High availability**
  - **High throughput network**
- **Grids are also particularly exposed**
  - **Transparent access/attack propagation from one site to another**
  - **Large number of identical hosts**
  - **Heterogeneous skills, staffing and security standards**
- **So far no "grid incident" ... but will happen (where the grid is the attack vector)**
- **A few incidents per year within the grids (see next slide)**

Grid Incident Statistic



Common Cause

- **From a site perspective, the incidents are often caused by:**
  - **Failure to apply security patches provided by vendors**
  - **Poor access control management (ex: root password)**
  - **Incidents at other sites**
  - **Unresolved past security incidents (lack of traceability)**
  - **Incorrect risk assessment (threats were not correctly identified)**
  - Shared user community, staff and computing resources between grids and HEP sites make propagation easier

Security Management

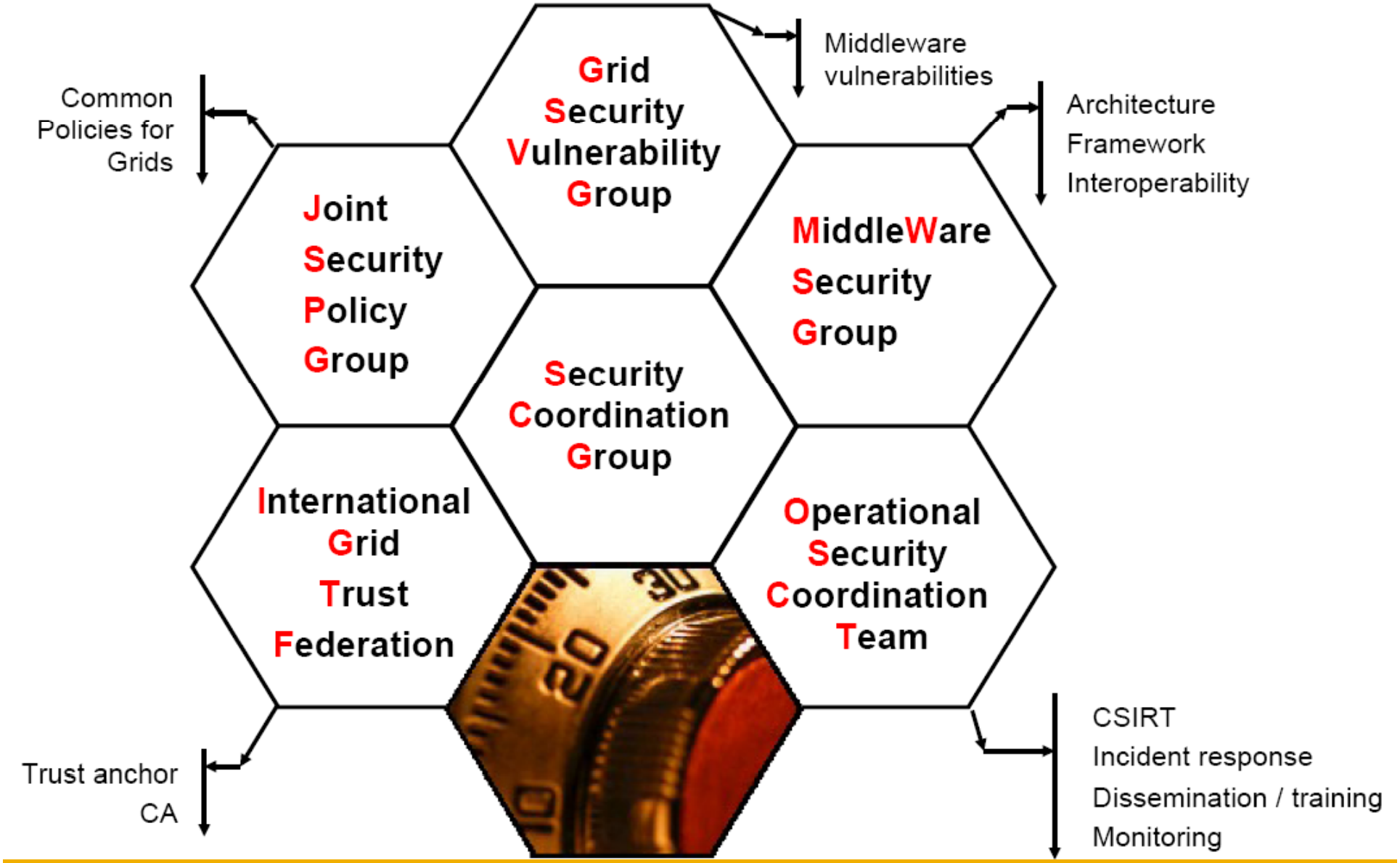
- **Risk management**
- **Security policy**
- **Security procedures, standards, guidelines, baselines**
- **Information classification**
- **Security education and awareness**

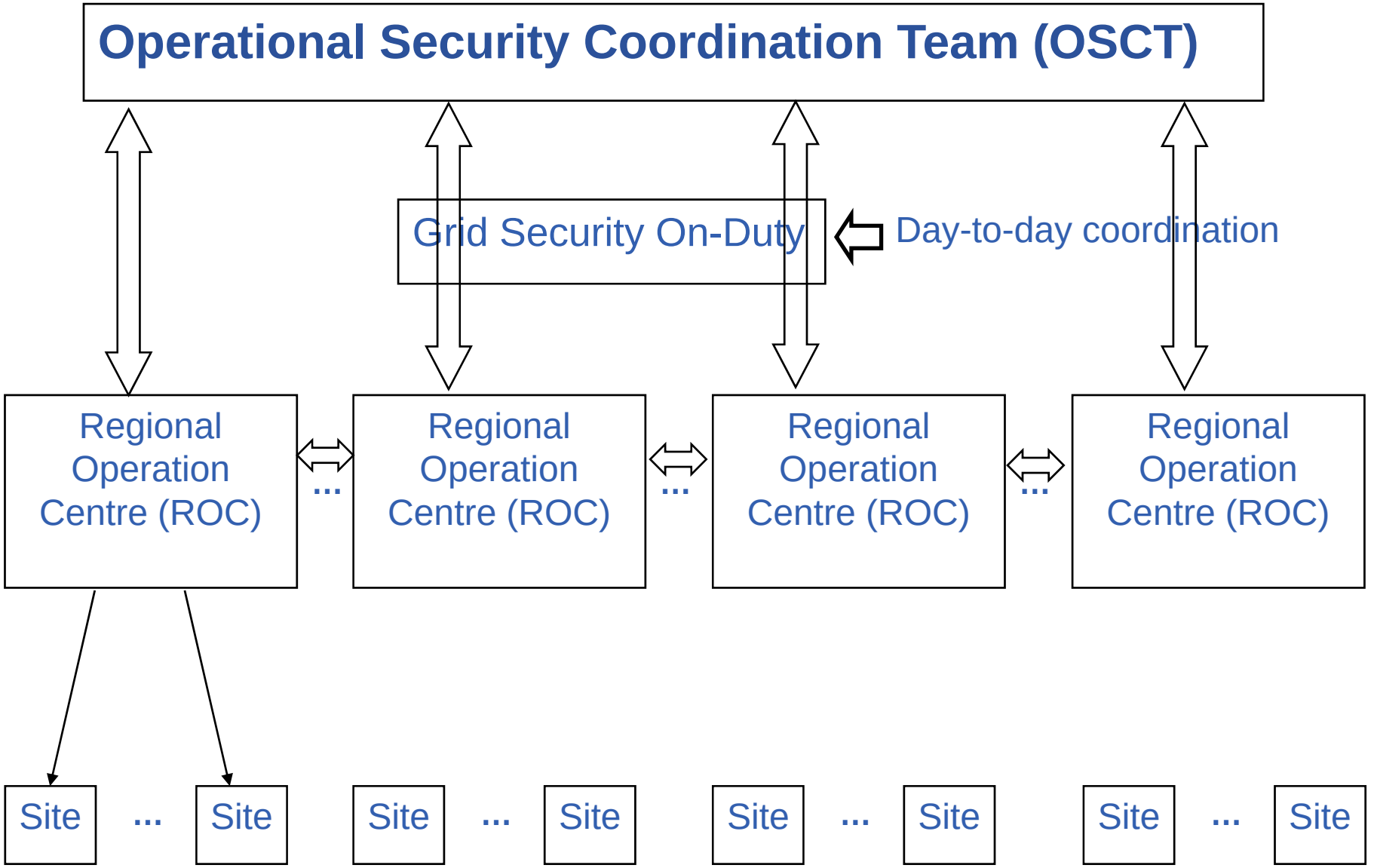
Risk Management

- **Computer Security is about understanding & managing the RISK**
- **Risk assessment**
  - Transfer
  - Avoid
  - Reduce
  - Accept
- **Balancing costs vs. benefits**

- **No perfect security**
- **The goal is to reduce the risk to an acceptable level**

EGEE Security Groups




Operational Security Coordination Team (OSCT)
Grid Security On-Duty
Day-to-day coordination
Regional Operation Centre (ROC)
Regional Operation Centre (ROC)
Regional Operation Centre (ROC)
Regional Operation Centre (ROC)
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OSCT Activities

- **Weekly telephone meeting; Twice F2F meeting per year**
- **Work together with other security groups to improve Grid security;**
- **Provide security expertise to sites;**
- **Handling and mitigating Grid security incidents**
  - Procedures; Incident tracking; IR Channel (list, IM) and Security Service Challenges;
- **Best practice, training and dissemination**
  - Security RSS feed; OSCT website/Wiki; Training events
- **Security Tools (monitoring, detection and prevention)**
  - Pakiti; SAM security tests
- **Analysing and evaluating security risks/vulnerabilities (together with GSVG)**

Conclusion

- **Grid is a valuable target**
  - Lot of powerful, but distributed hosts
  - High bandwidth connection
- **Grid is also particularly exposed**
  - transparent access to resources & very well interconnected
  - Similar/identical systems (OS and Grid middleware)
- **Ways to improve:**
  - Training and dissemination (require significant efforts)
    - Both users and system administrators/site managers
  - Ability to test and monitor the Grid
  - Cooperation and sharing between sites and with peer grids
  - Building up expertise/experience in the team
  - Security management is the key

Links and Support Contacts

EGEE Security

http://www.eu-egee.org/security/

OSCT website and Wiki

http://osct.web.cern.ch/osct/

https://twiki.cern.ch/twiki/bin/view/LCG/OSCT

Security RSS feed

http://rss-grid-security.cern.ch/rss.php

Vulnerability reporting

- grid-vulnerability-report@cern.ch

Incident reporting

- project-egee-security-support@cern.ch
- Incident response procedure
  - https://edms.cern.ch/document/867454/

Discussion