Proactive & Reactive Forensics

Forensics, Antiforensics & Automation

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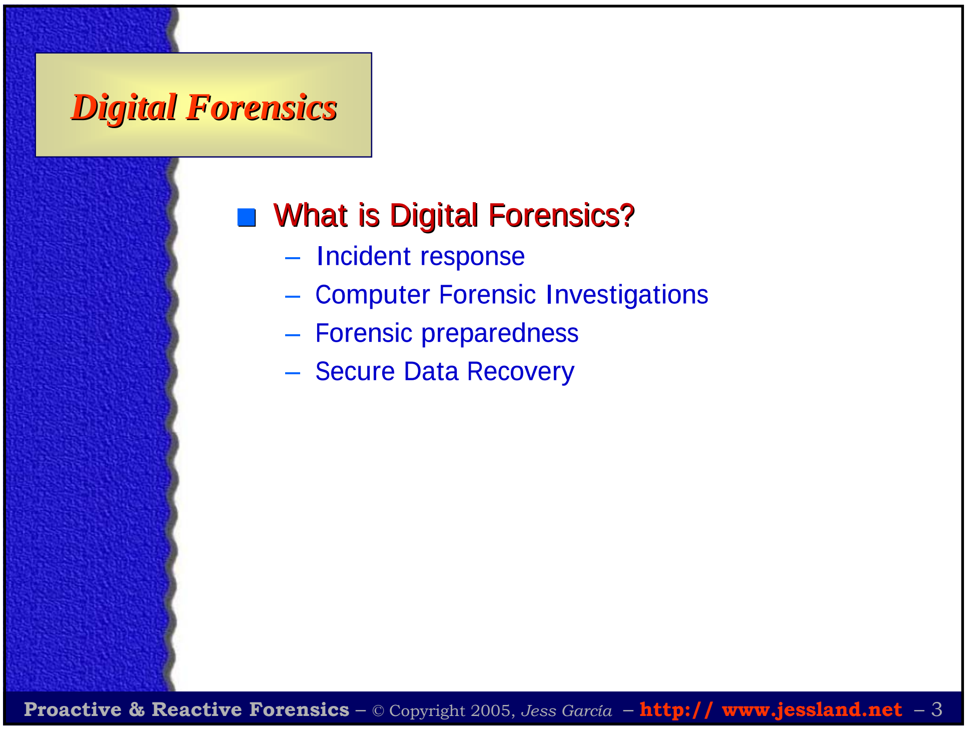
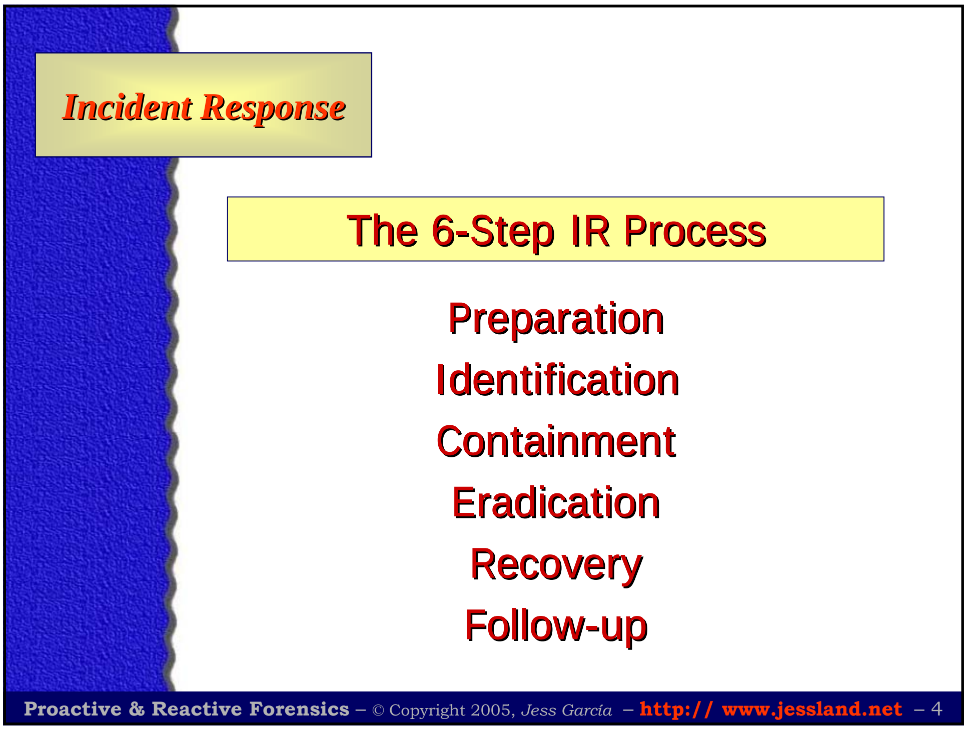
Agenda

- IR & Forensics
- Antiforensics
- Forensics Readiness
- Automated Forensics



Digital Forensics

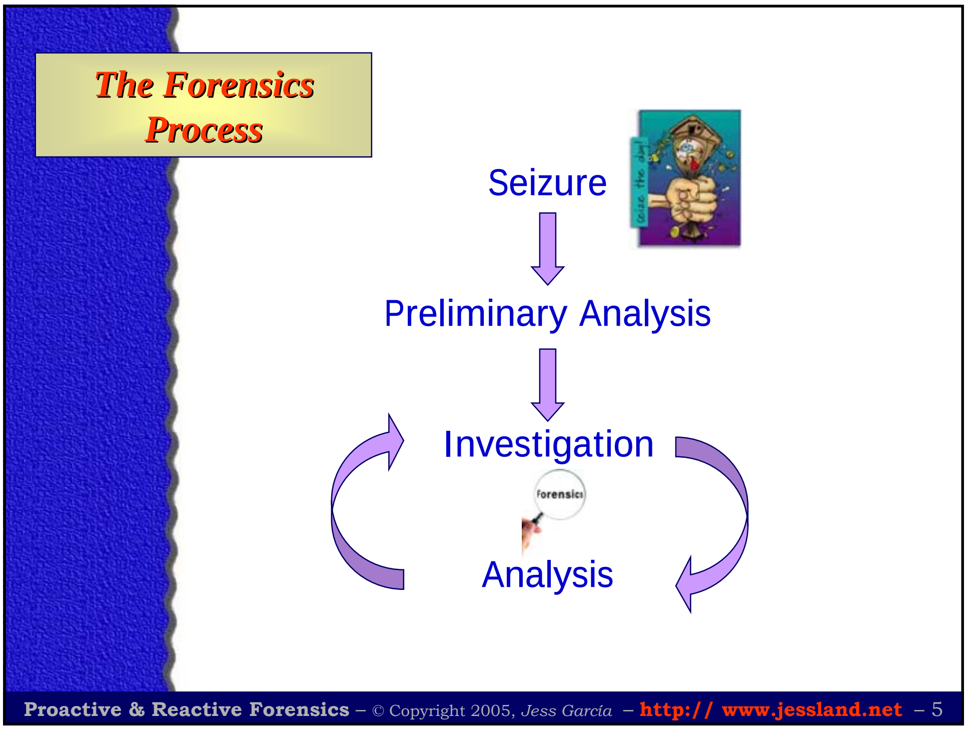
- What is Digital Forensics?
  - Incident response
  - Computer Forensic Investigations
  - Forensic preparedness
  - Secure Data Recovery



Incident Response

The 6-Step IR Process

Preparation
Identification
Containment
Eradication
Recovery
Follow-up



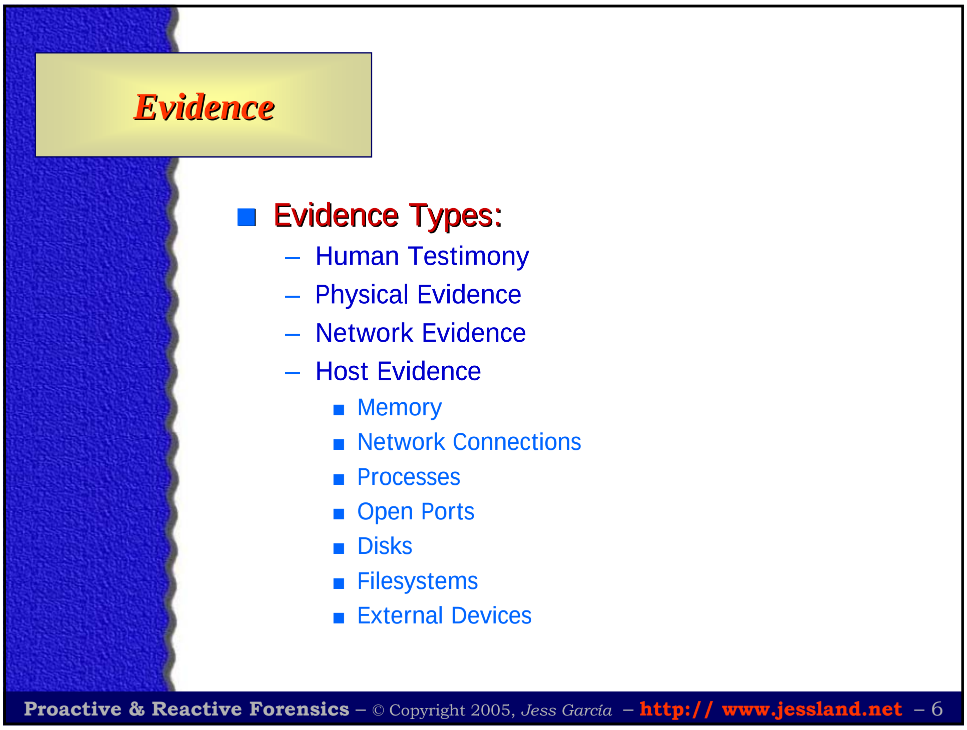
The Forensics Process

Seizure

Preliminary Analysis

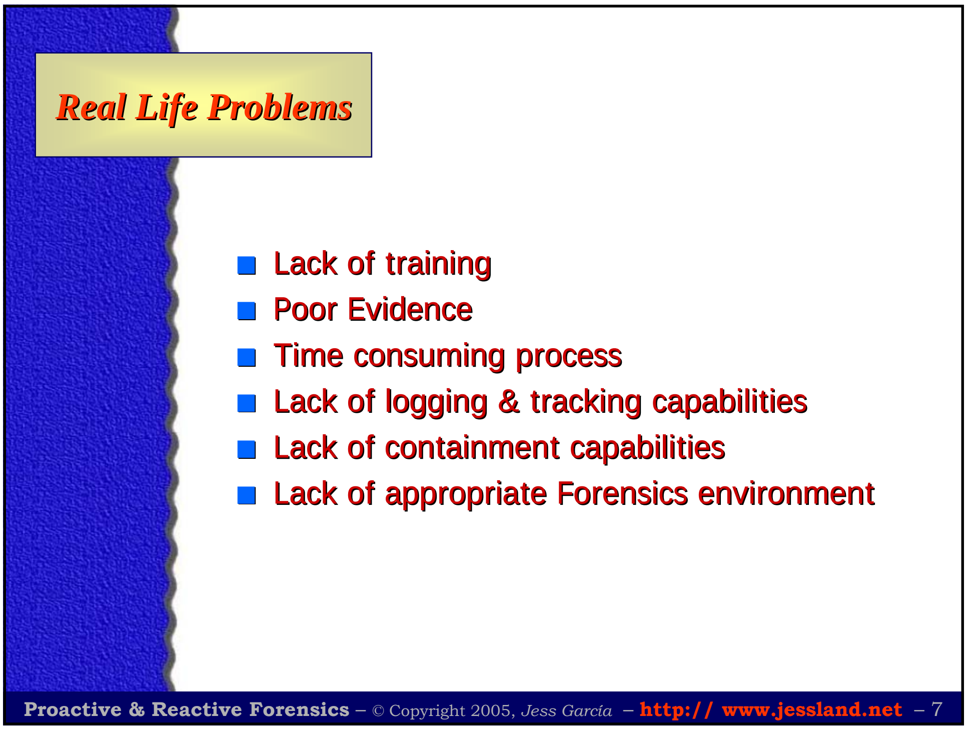
Investigation

Analysis



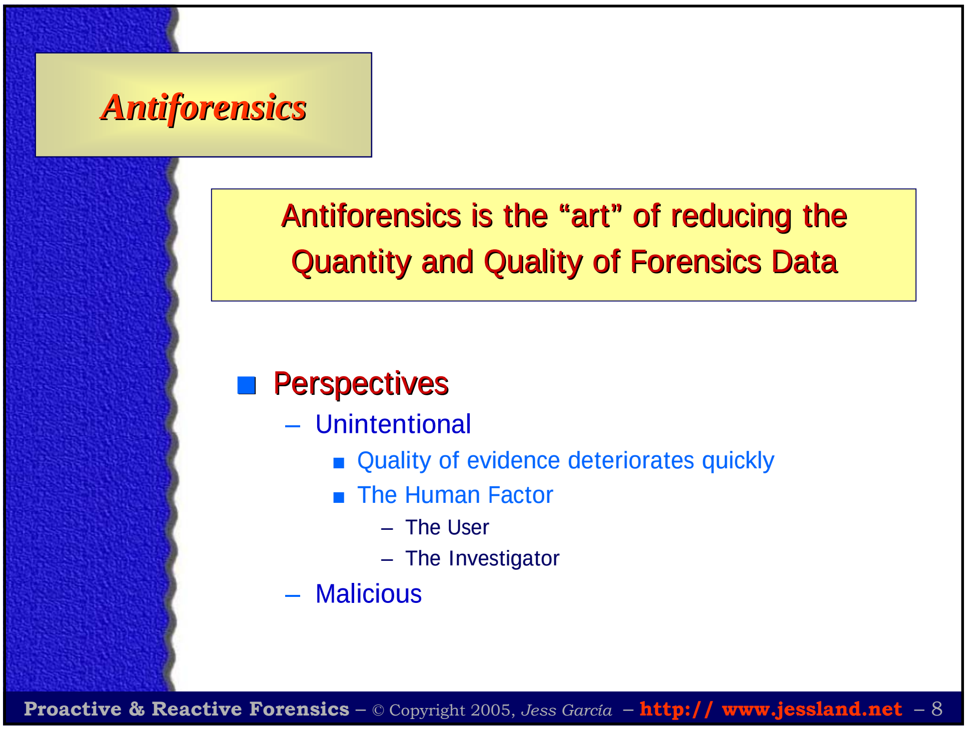
Evidence

- Evidence Types:
  - Human Testimony
  - Physical Evidence
  - Network Evidence
  - Host Evidence
    - Memory
    - Network Connections
    - Processes
    - Open Ports
    - Disks
    - Filesystems
    - External Devices



Real Life Problems

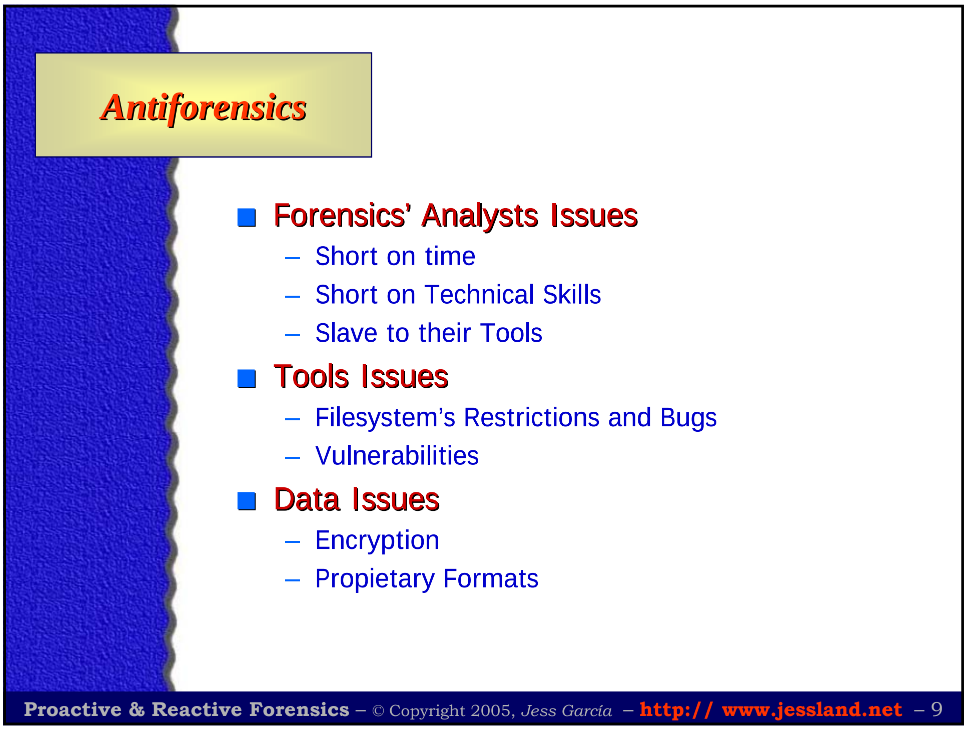
- Lack of training
- Poor Evidence
- Time consuming process
- Lack of logging & tracking capabilities
- Lack of containment capabilities
- Lack of appropriate Forensics environment



Antiforensics

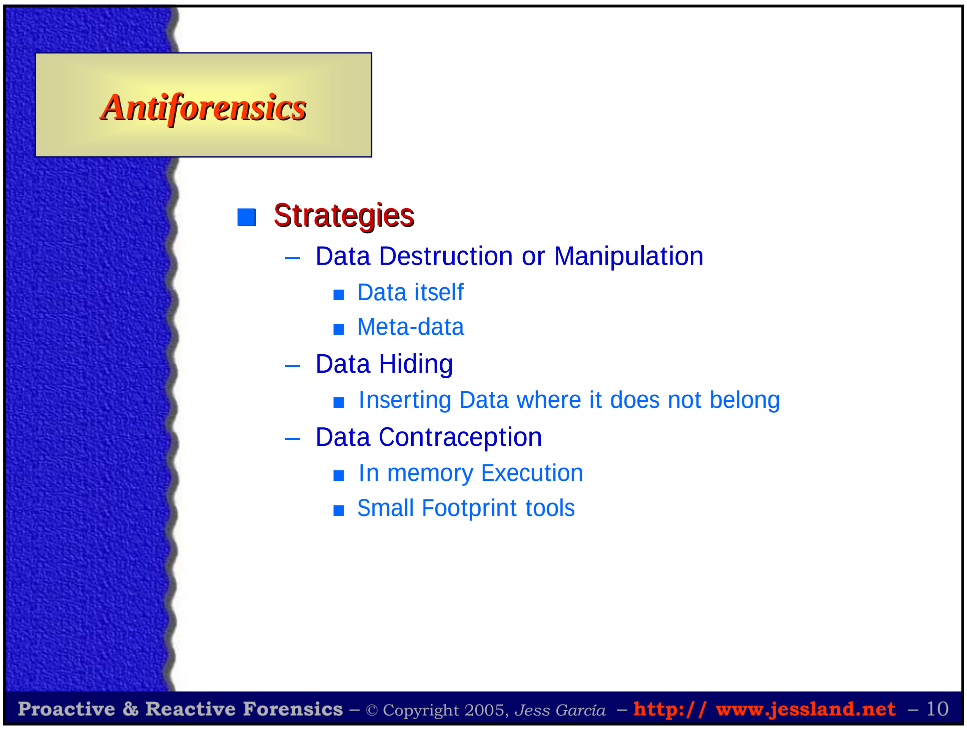
Antiforensics is the “art” of reducing the Quantity and Quality of Forensics Data

- Perspectives
  - Unintentional
    - Quality of evidence deteriorates quickly
    - The Human Factor
      - The User
      - The Investigator
  - Malicious



Antiforensics

- Forensics' Analysts Issues
  - Short on time
  - Short on Technical Skills
  - Slave to their Tools
- Tools Issues
  - Filesystem's Restrictions and Bugs
  - Vulnerabilities
- Data Issues
  - Encryption
  - Propietary Formats



Antiforensics

- Strategies
  - Data Destruction or Manipulation
    - Data itself
    - Meta-data
  - Data Hiding
    - Inserting Data where it does not belong
  - Data Contraception
    - In memory Execution
    - Small Footprint tools

Forensics Readiness

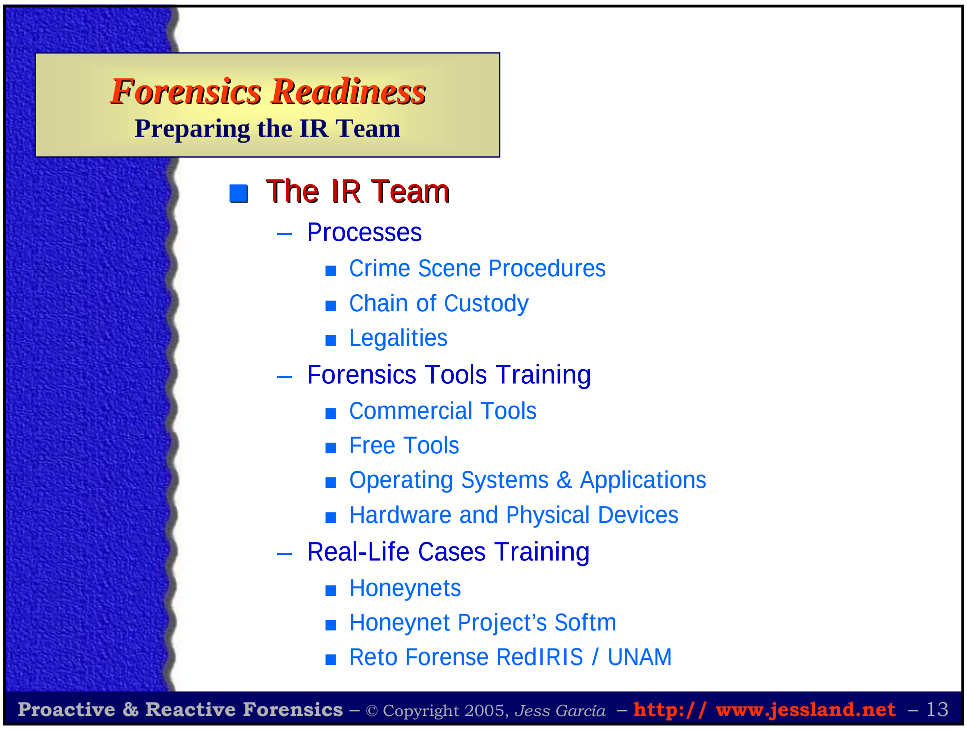
Forensics Readiness is the “art” of Maximizing an Environment’s Ability to Collect Credible Digital Evidence

No system or network is secure enough

Forensics Readiness

Preparing IR Capabilities

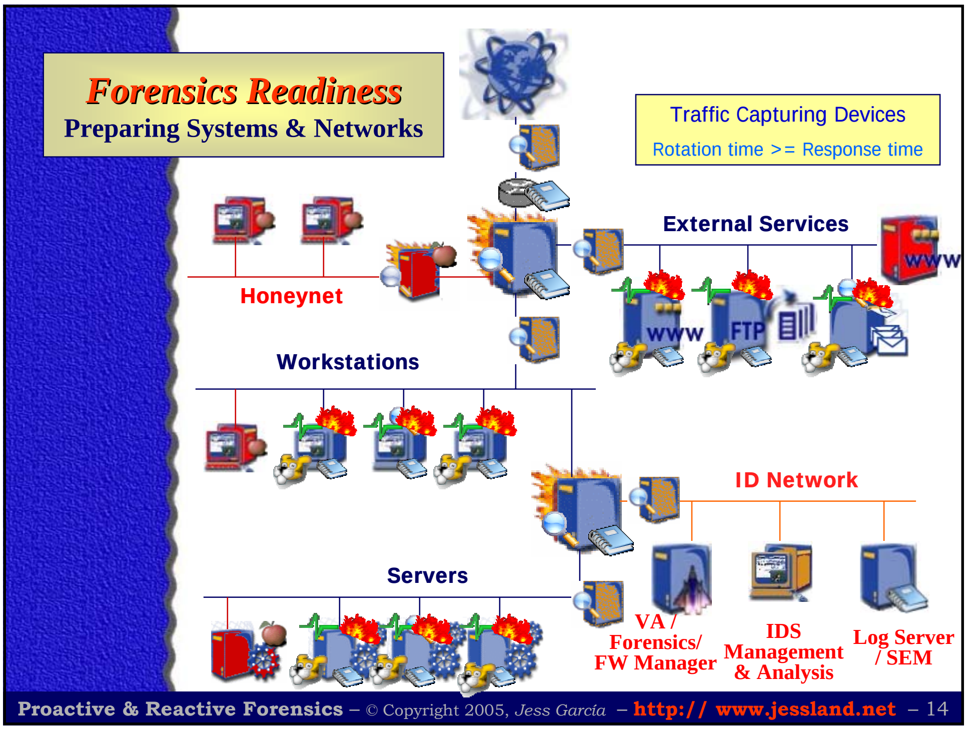
- Building your IR Capabilities
  - The Lab
    - Isolated Network
    - Isolated Systems
    - Forensics Servers
    - Disk Servers
    - Short and Long Term Secure Storage
  - The Jump Bag
    - Blank Media
    - Disk Duplicators
    - Networking Gear
    - ... !!! ...
  - The Tools
    - Forensics Software Processes



Forensics Readiness

Preparing the IR Team

- The IR Team
  - Processes
    - Crime Scene Procedures
    - Chain of Custody
    - Legalities
  - Forensics Tools Training
    - Commercial Tools
    - Free Tools
    - Operating Systems & Applications
    - Hardware and Physical Devices
  - Real-Life Cases Training
    - Honeynets
    - Honeynet Project’s Softm
    - Reto Forense RedIRIS / UNAM



Forensics Readiness

Preparing Systems & Networks

Traffic Capturing Devices
Rotation time >= Response time

External Services

Honeynet

Workstations

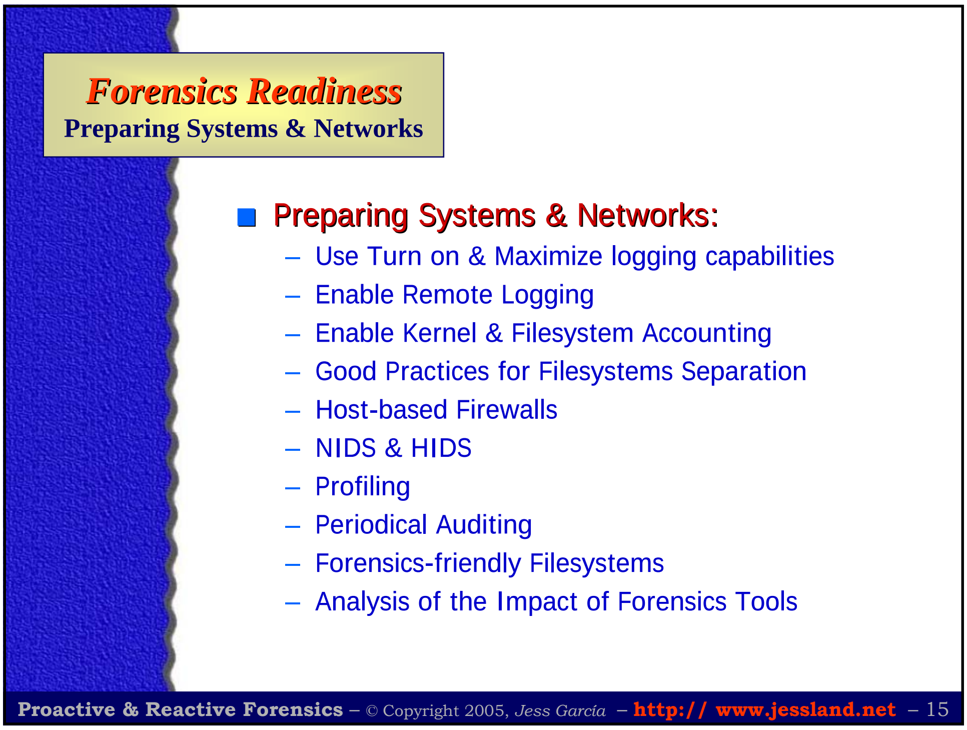
ID Network

Servers

VA / Forensics/ FW Manager

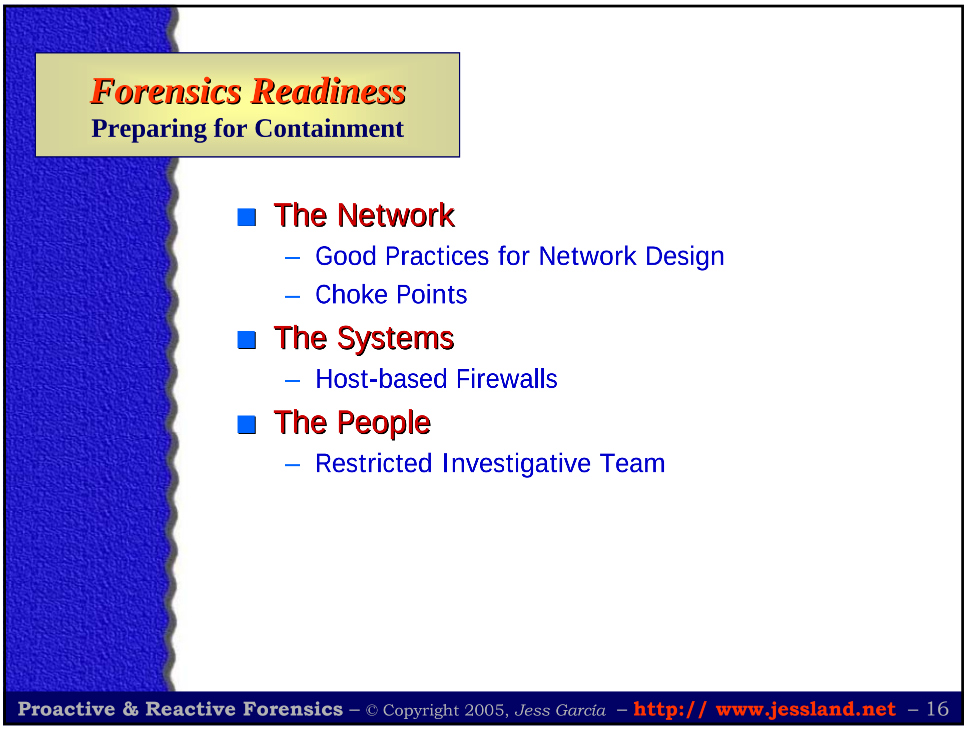
IDS Management & Analysis

Log Server / SEM



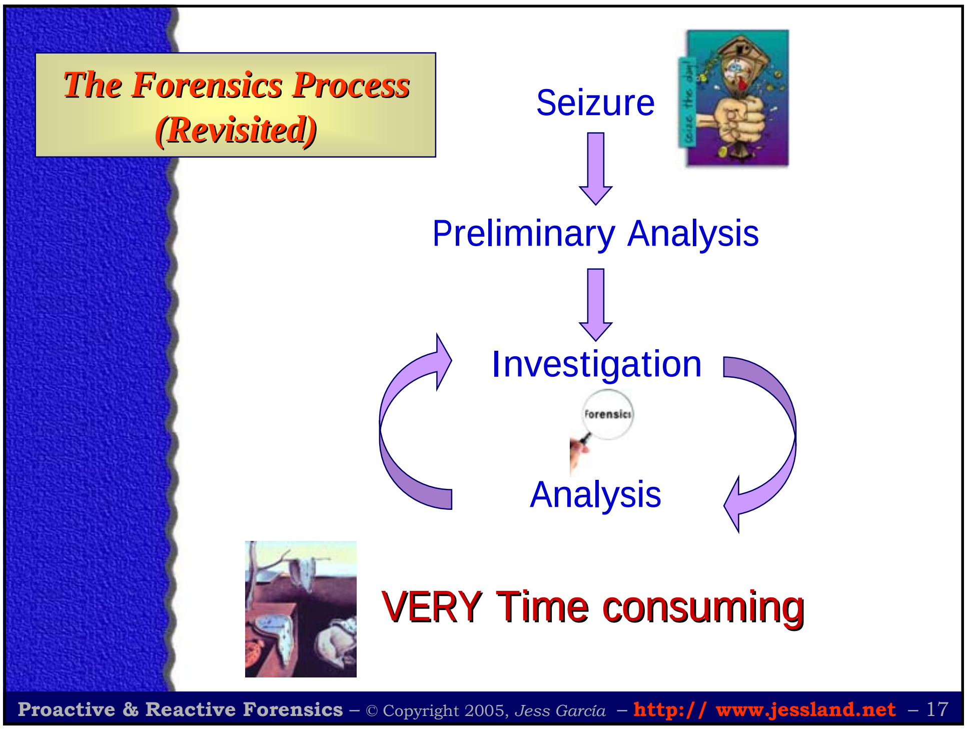
Forensics Readiness
Preparing Systems & Networks

- Preparing Systems & Networks:
  - Use Turn on & Maximize logging capabilities
  - Enable Remote Logging
  - Enable Kernel & Filesystem Accounting
  - Good Practices for Filesystems Separation
  - Host-based Firewalls
  - NIDS & HIDS
  - Profiling
  - Periodical Auditing
  - Forensics-friendly Filesystems
  - Analysis of the Impact of Forensics Tools



Forensics Readiness
Preparing for Containment

- The Network
  - Good Practices for Network Design
  - Choke Points
- The Systems
  - Host-based Firewalls
- The People
  - Restricted Investigative Team



The Forensics Process (Revisited)

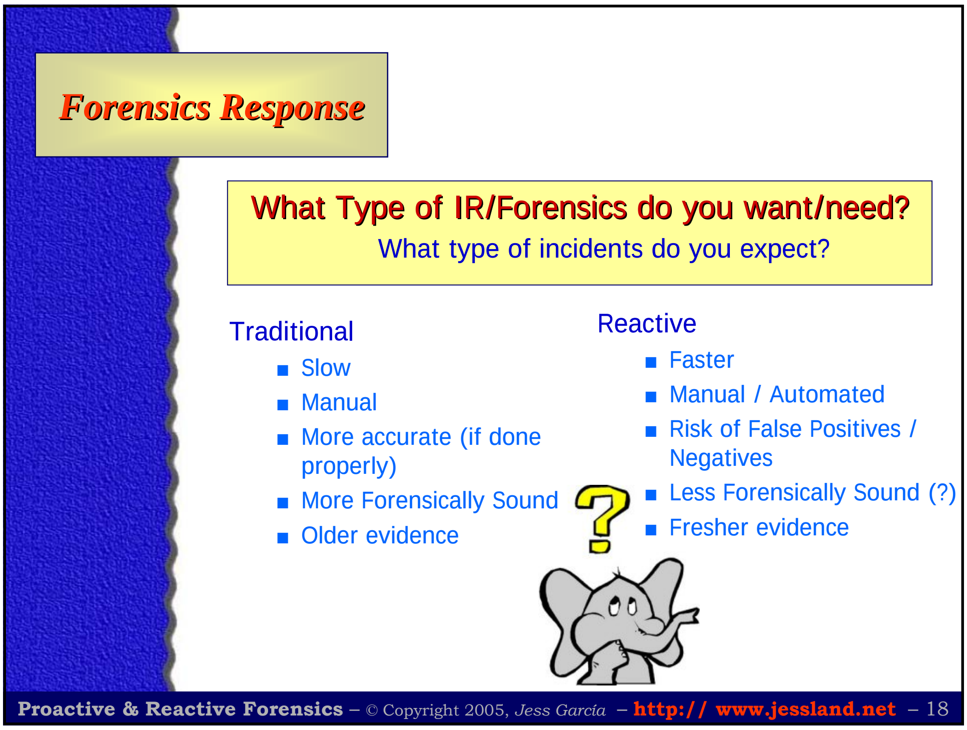
Seizure

Preliminary Analysis

Investigation

Analysis

VERY Time consuming



Forensics Response

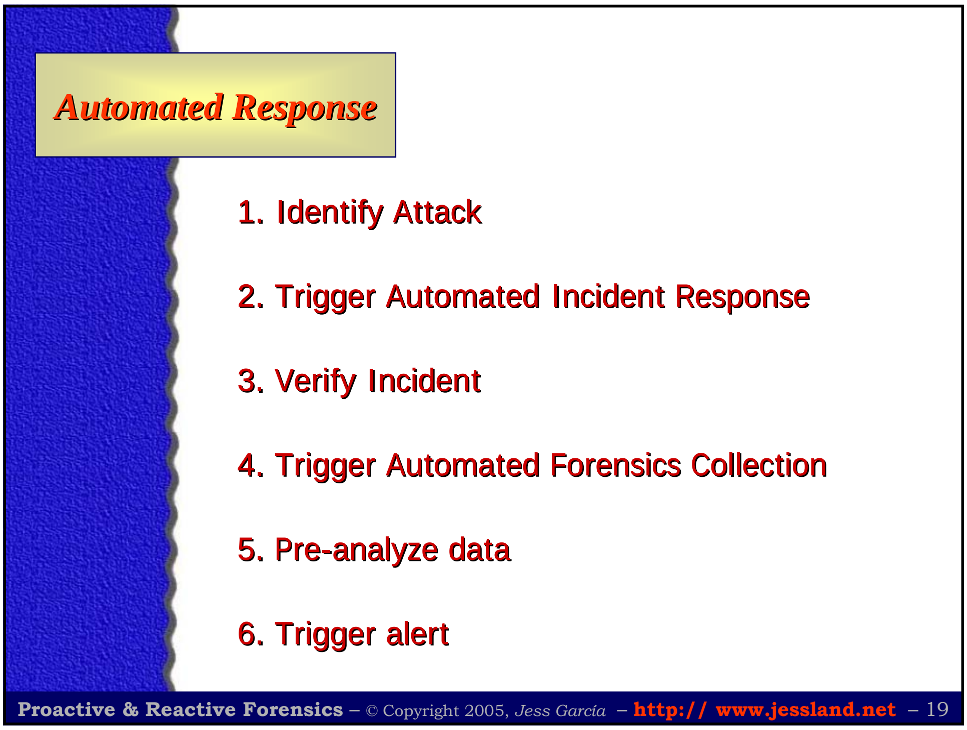
What Type of IR/Forensics do you want/need?
What type of incidents do you expect?

Traditional

- Slow
- Manual
- More accurate (if done properly)
- More Forensically Sound
- Older evidence

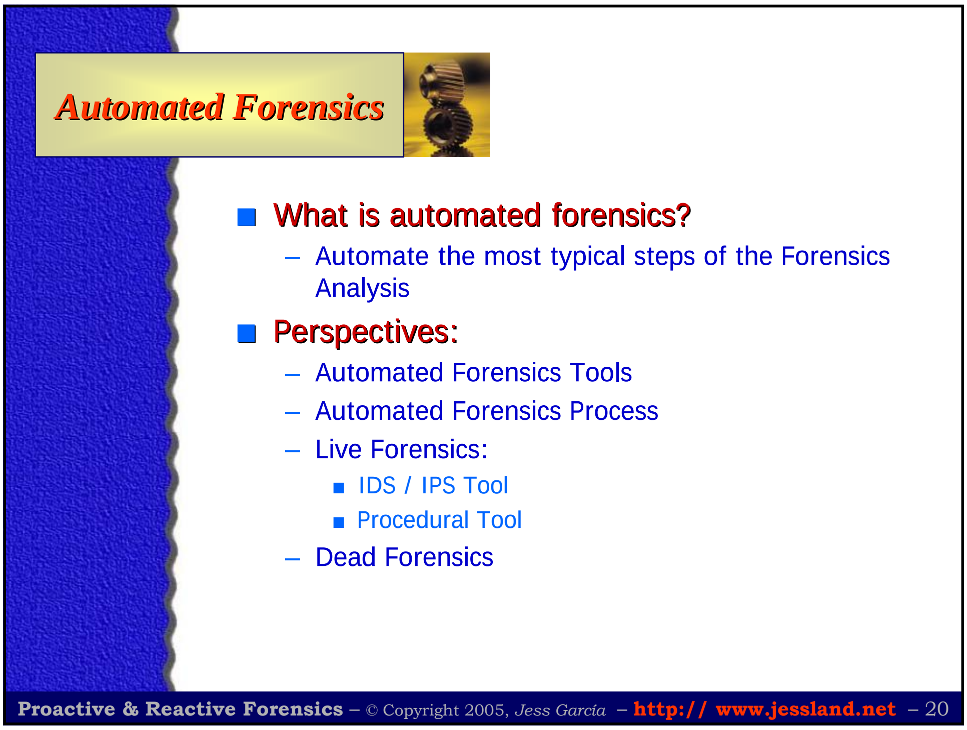
Reactive

- Faster
- Manual / Automated
- Risk of False Positives / Negatives
- Less Forensically Sound (?)
- Fresher evidence



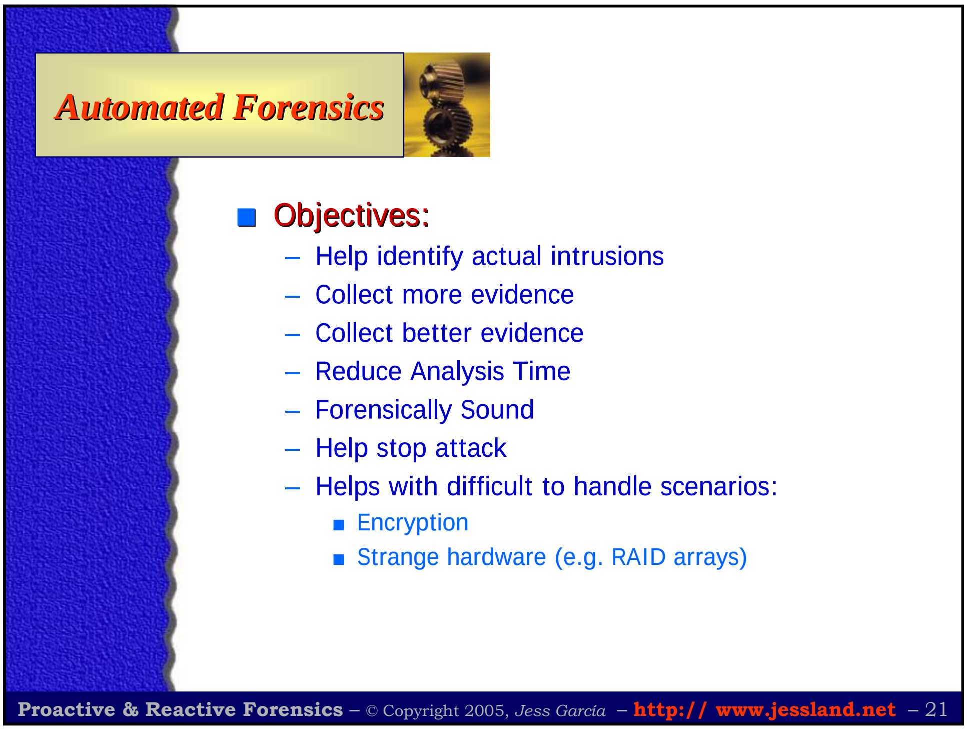
Automated Response

1. Identify Attack
2. Trigger Automated Incident Response
3. Verify Incident
4. Trigger Automated Forensics Collection
5. Pre-analyze data
6. Trigger alert



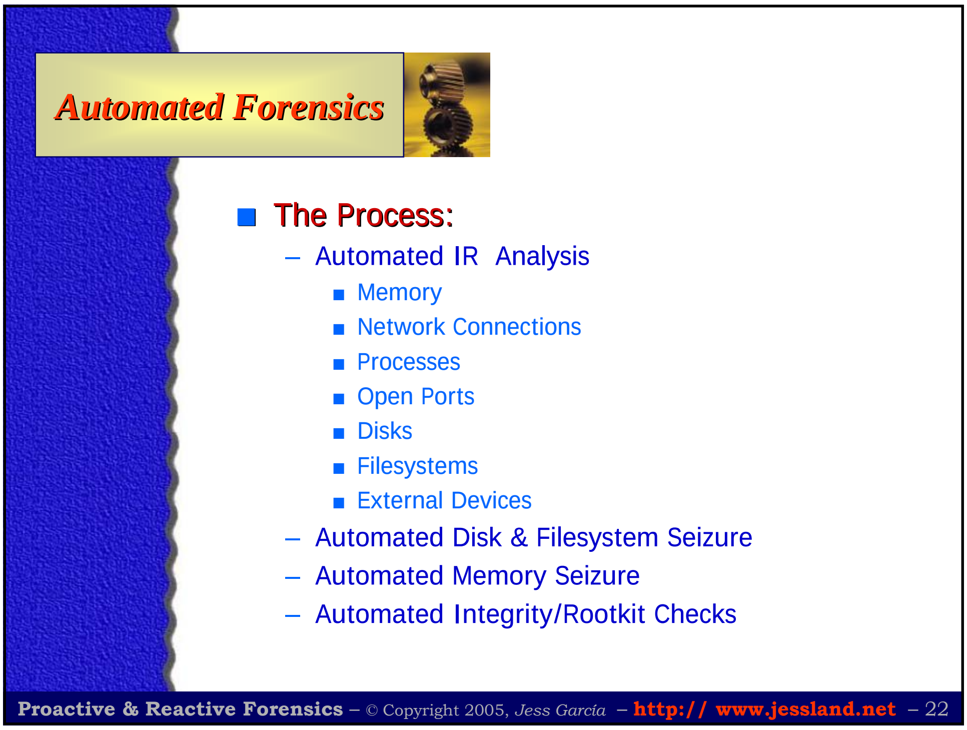
Automated Forensics

- What is automated forensics?
  - Automate the most typical steps of the Forensics Analysis
- Perspectives:
  - Automated Forensics Tools
  - Automated Forensics Process
  - Live Forensics:
    - IDS / IPS Tool
    - Procedural Tool
  - Dead Forensics



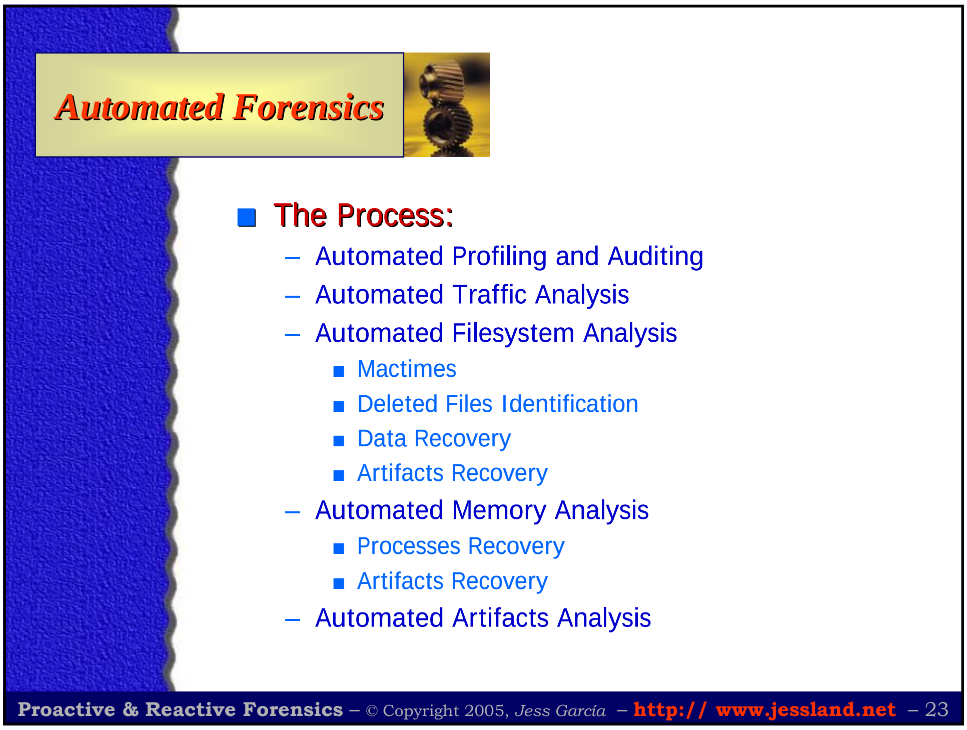
Automated Forensics

- Objectives:
  - Help identify actual intrusions
  - Collect more evidence
  - Collect better evidence
  - Reduce Analysis Time
  - Forensically Sound
  - Help stop attack
  - Helps with difficult to handle scenarios:
    - Encryption
    - Strange hardware (e.g. RAID arrays)



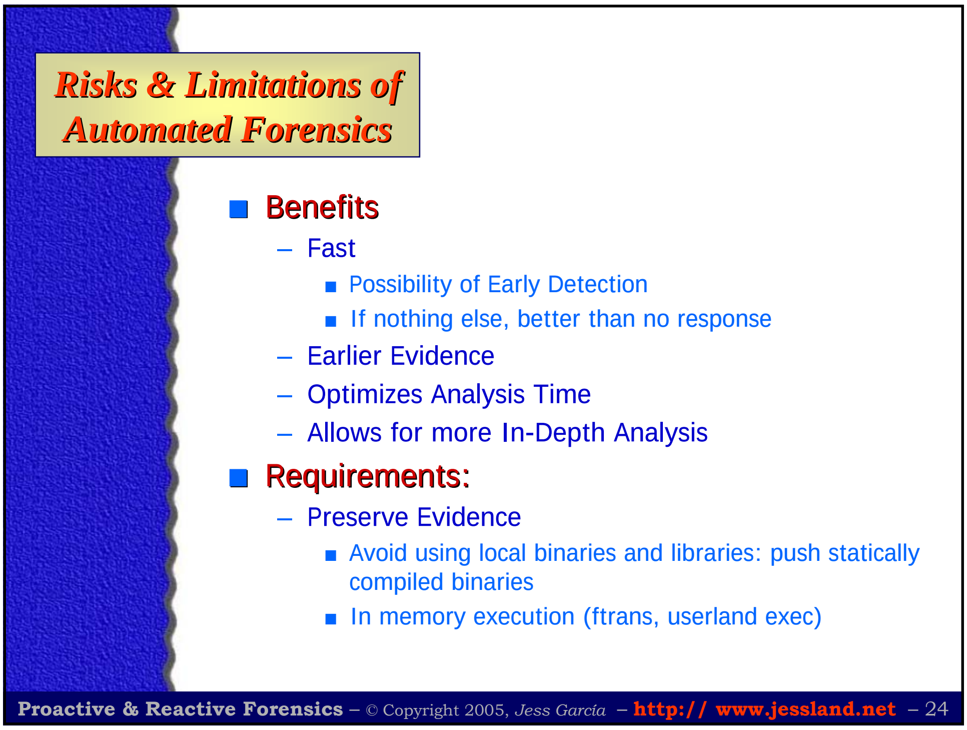
Automated Forensics

- The Process:
  - Automated IR Analysis
    - Memory
    - Network Connections
    - Processes
    - Open Ports
    - Disks
    - Filesystems
    - External Devices
  - Automated Disk & Filesystem Seizure
  - Automated Memory Seizure
  - Automated Integrity/Rootkit Checks



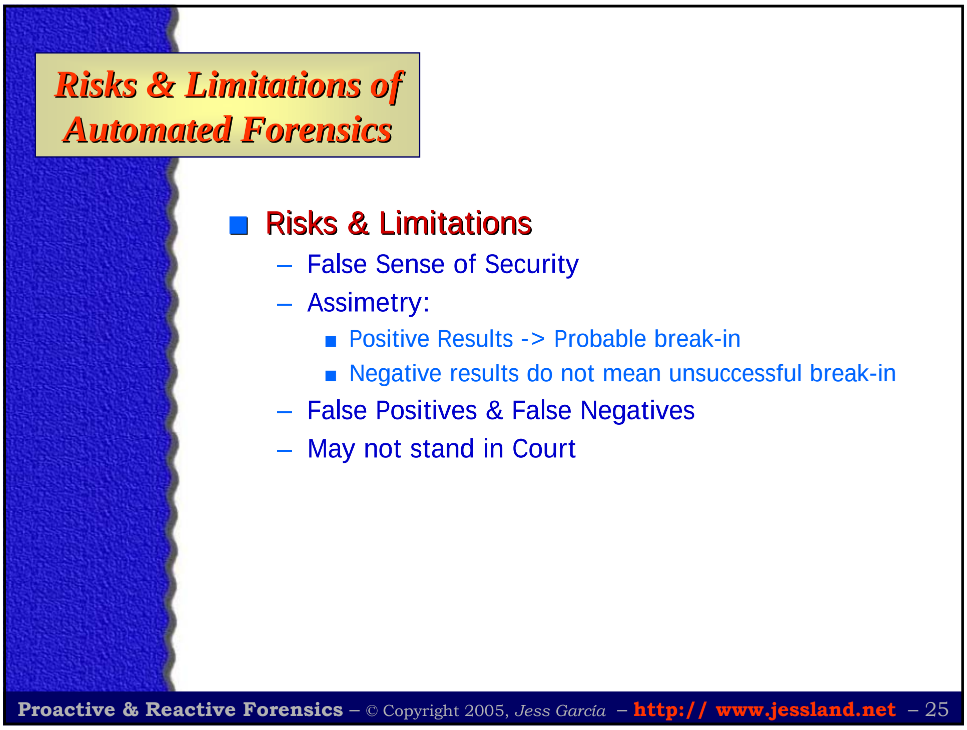
Automated Forensics

- The Process:
  - Automated Profiling and Auditing
  - Automated Traffic Analysis
  - Automated Filesystem Analysis
    - Mactimes
    - Deleted Files Identification
    - Data Recovery
    - Artifacts Recovery
  - Automated Memory Analysis
    - Processes Recovery
    - Artifacts Recovery
  - Automated Artifacts Analysis



Risks & Limitations of Automated Forensics

- Benefits
  - Fast
    - Possibility of Early Detection
    - If nothing else, better than no response
  - Earlier Evidence
  - Optimizes Analysis Time
  - Allows for more In-Depth Analysis
- Requirements:
  - Preserve Evidence
    - Avoid using local binaries and libraries: push statically compiled binaries
    - In memory execution (ftrans, userland exec)



Risks & Limitations of Automated Forensics

- Risks & Limitations
  - False Sense of Security
  - Assimetry:
    - Positive Results -> Probable break-in
    - Negative results do not mean unsuccessful break-in
  - False Positives & False Negatives
  - May not stand in Court