SAND2015-9685C

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Risk Based Approach for Security Management

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U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

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Why is so much attention being given to Nuclear Security?

1997, North Hollywood Shootout
Two bank robbers in North Hollywood and the Los Angeles Police Department fired some 2,000 rounds in a shootout. Both robbers were killed, 11 police officers and 7 civilians were injured and numerous vehicles and other property was damaged. *[Source: Wikipedia]*

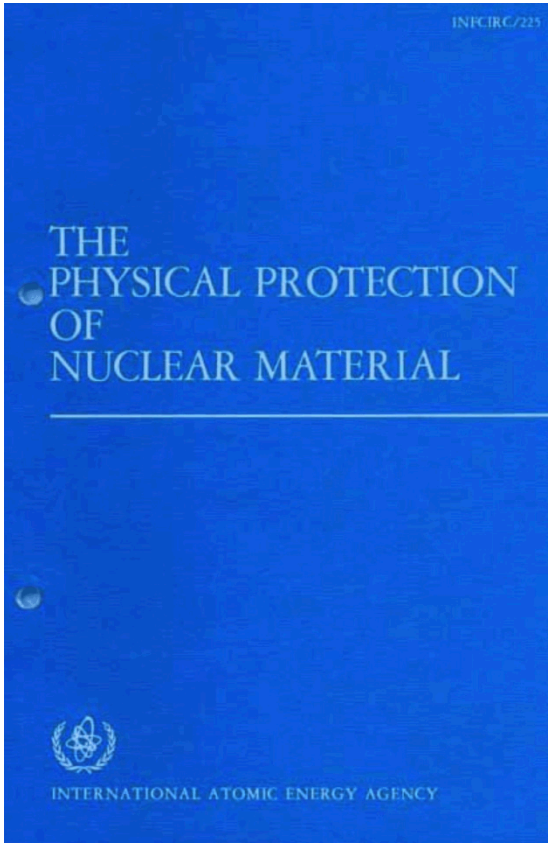
Objective

Describe the historical growth of interest in nuclear security and the corresponding developments in nuclear security as a technical discipline.

History: Pre-security

- Security has existed as long as mankind has possessed something of value
  - Brute force approach
    - Gates, Guns, Guards
- Euphoria of *Atoms for Peace* overwhelmed any considerations for security
  - Lack of any nuclear security event history
- Security concerns seem to have grown slowly, first recognized in the late 1960's/early 70's.
  - Concerns evolved due to:
    - Growing fears of potential nuclear consequences
    - Plethora of regional criminal and terrorist groups
    - Nuclear Bomb Threat
- Security concerns were facilitated by a growing sophistication of media communication
  - These issues combined to grow concerns for security of nuclear material

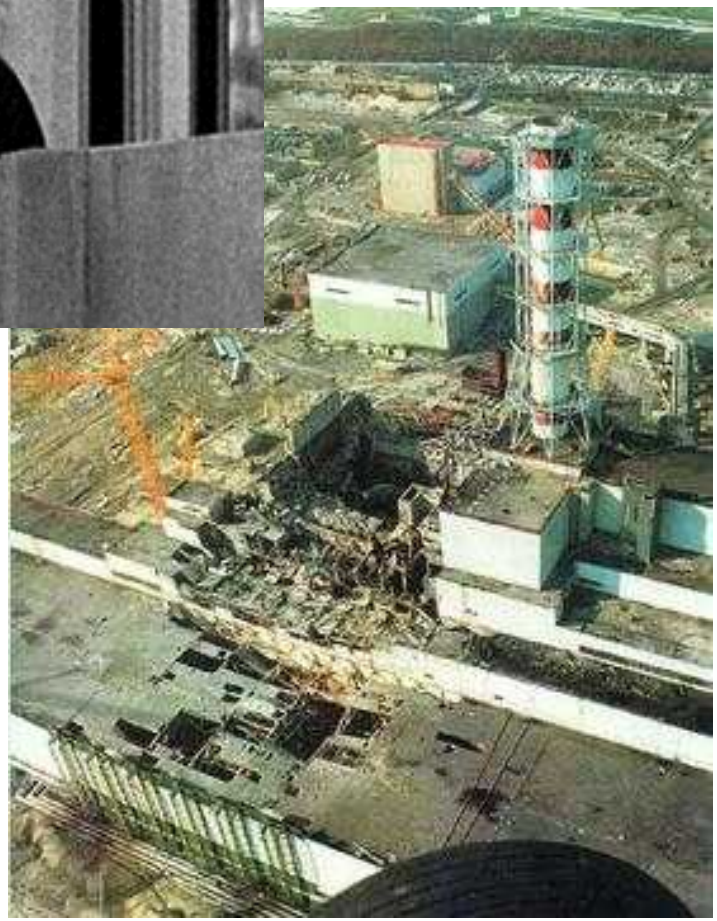
History



1975 First INFCIRC/225
(1972 First Guidance by IAEA DG)

1972 Munich Olympics

Sources: Wikipedia



1986 Chernobyl

History

9/11 Events

- WTCs hit with 2 hijacked planes - 2759 killed, 8700 injured
- Pentagon hit with a hijacked plane - 189 killed, 200 injured
- Pennsylvania field where a hijacked plane was crashed - 45 killed

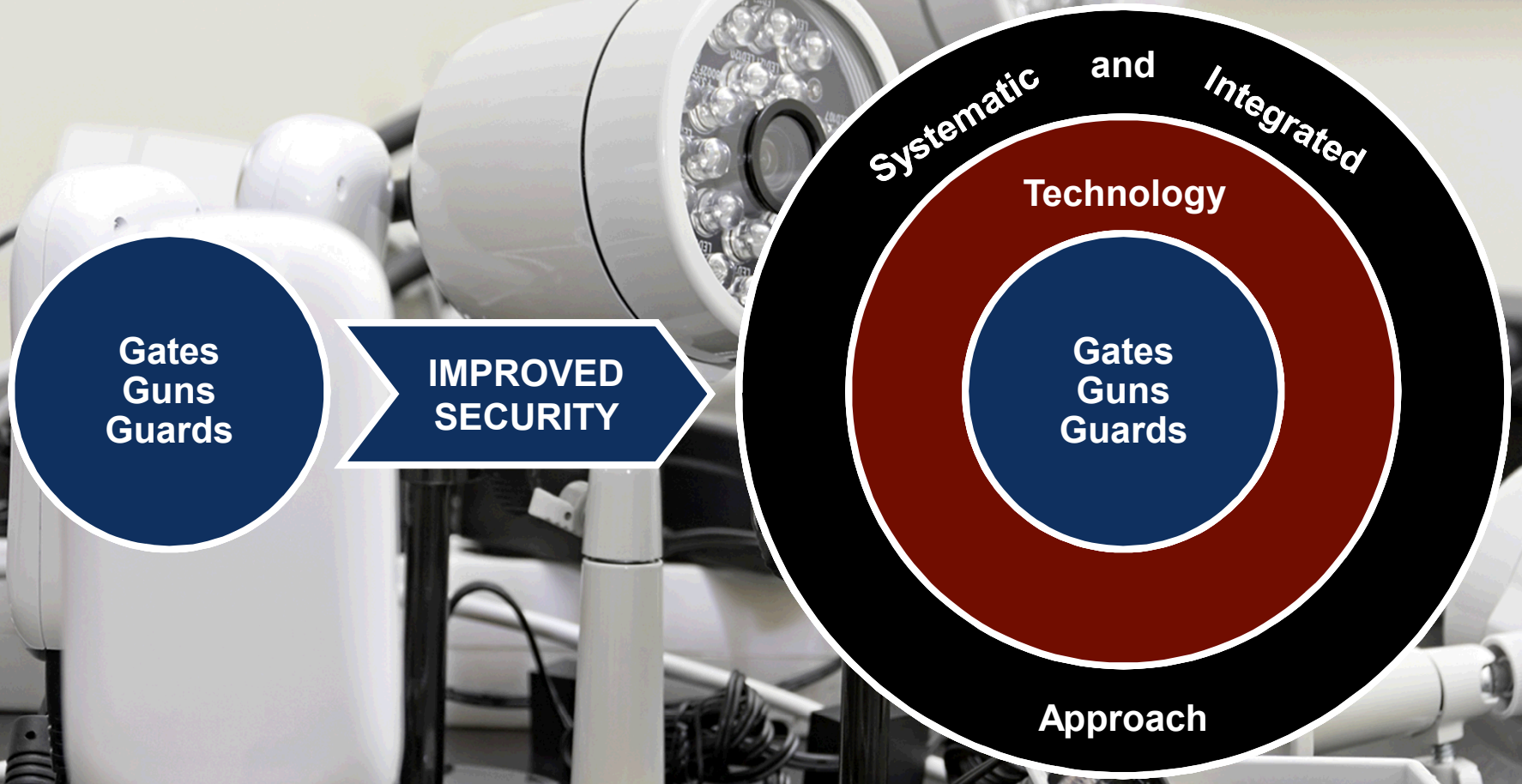
Flight 93

WTC

Sources: Wikipedia

Pentagon

History


Gates
Guns
Guards
IMPROVED
SECURITY
Systematic and Integrated
Technology
Gates
Guns
Guards
Approach

What is Nuclear Security?

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International Nuclear Security objective:
"***prevent***, ***detect*** and ***respond*** to … theft, sabotage … and other malicious acts involving nuclear materials, radioactive materials, and their associated facilities"

SAFETY
Radiological release due to systems failure, human error, or natural disaster.

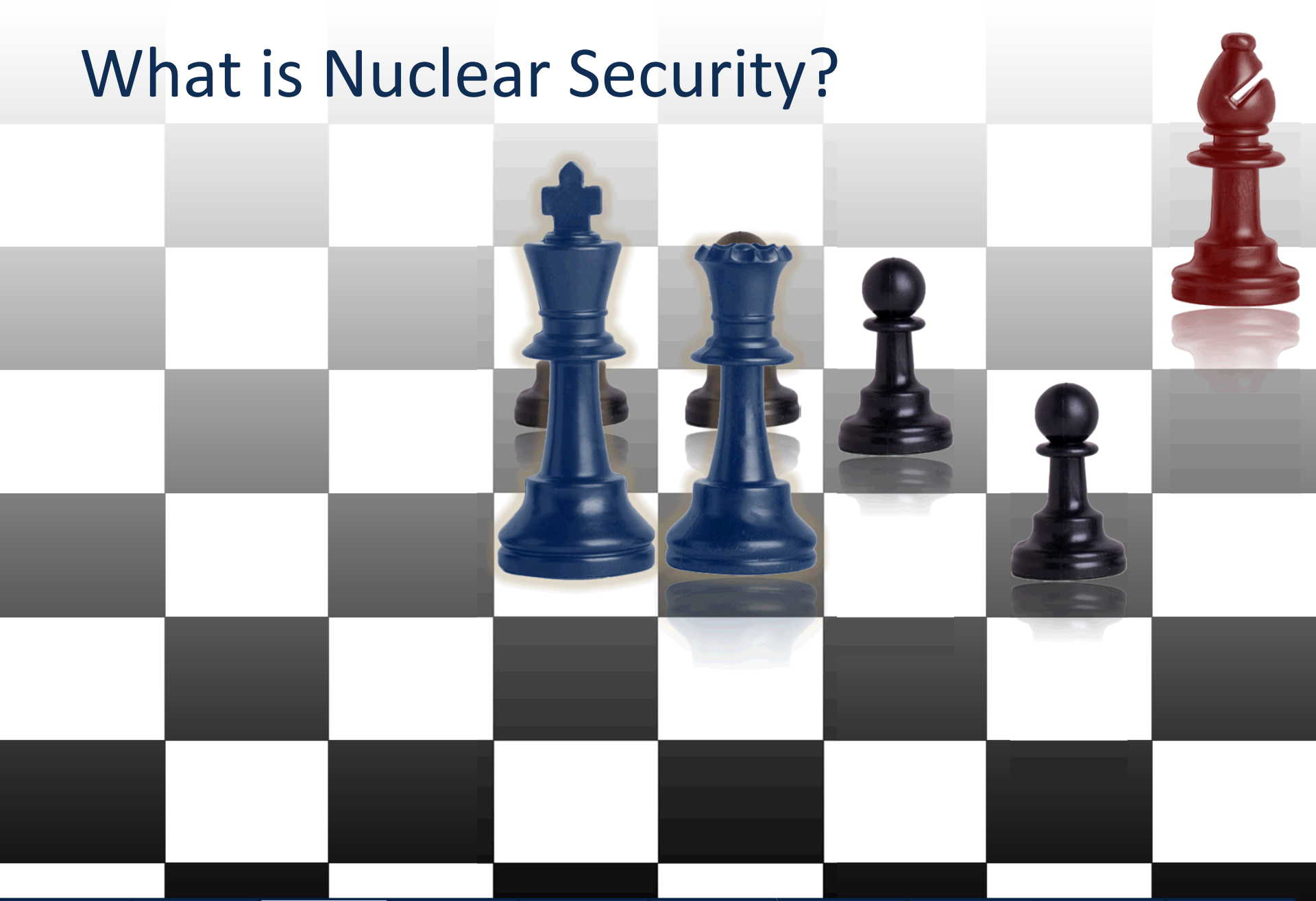
SECURITY
Radiological release caused by sabotage, external attack, malicious act.

Prevent proliferation by non-state actors.

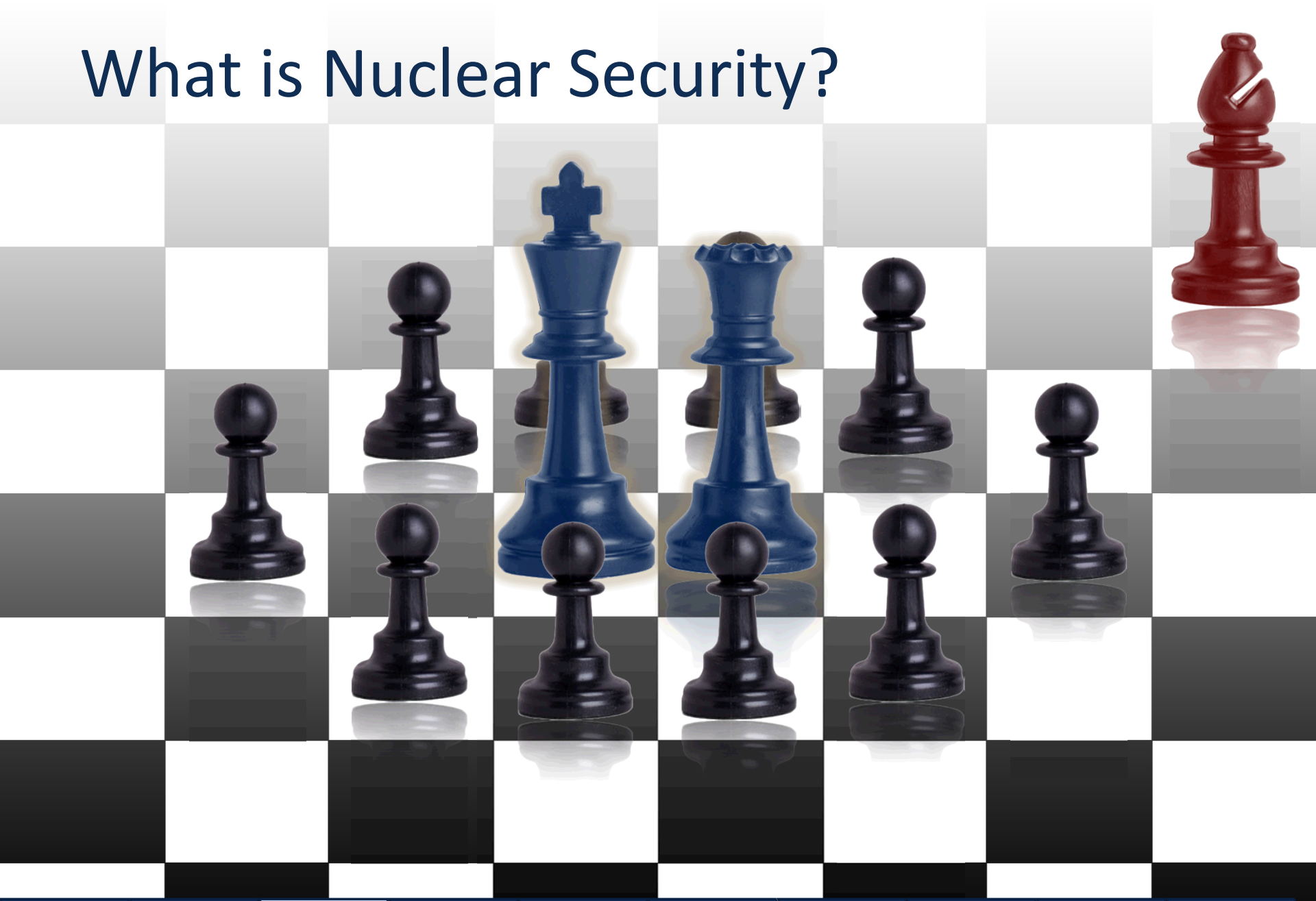
SAFEGUARDS
Prevent proliferation of nuclear weapons.

Nuclear Security provides a vital complement to both Nuclear Safety and Nuclear Safeguards.

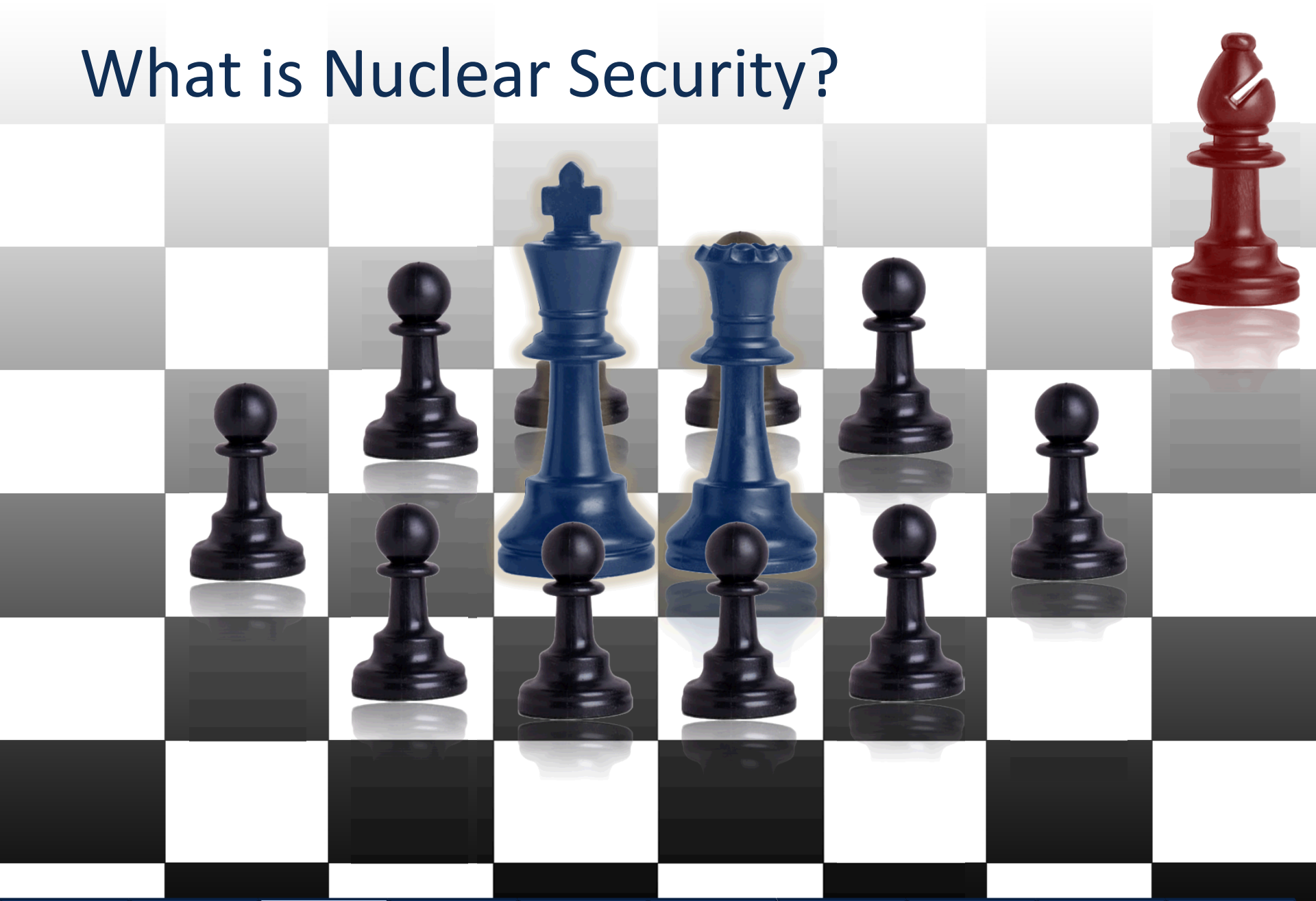
What is Nuclear Security?



What is Nuclear Security?



What is Nuclear Security?



What is Nuclear Security?

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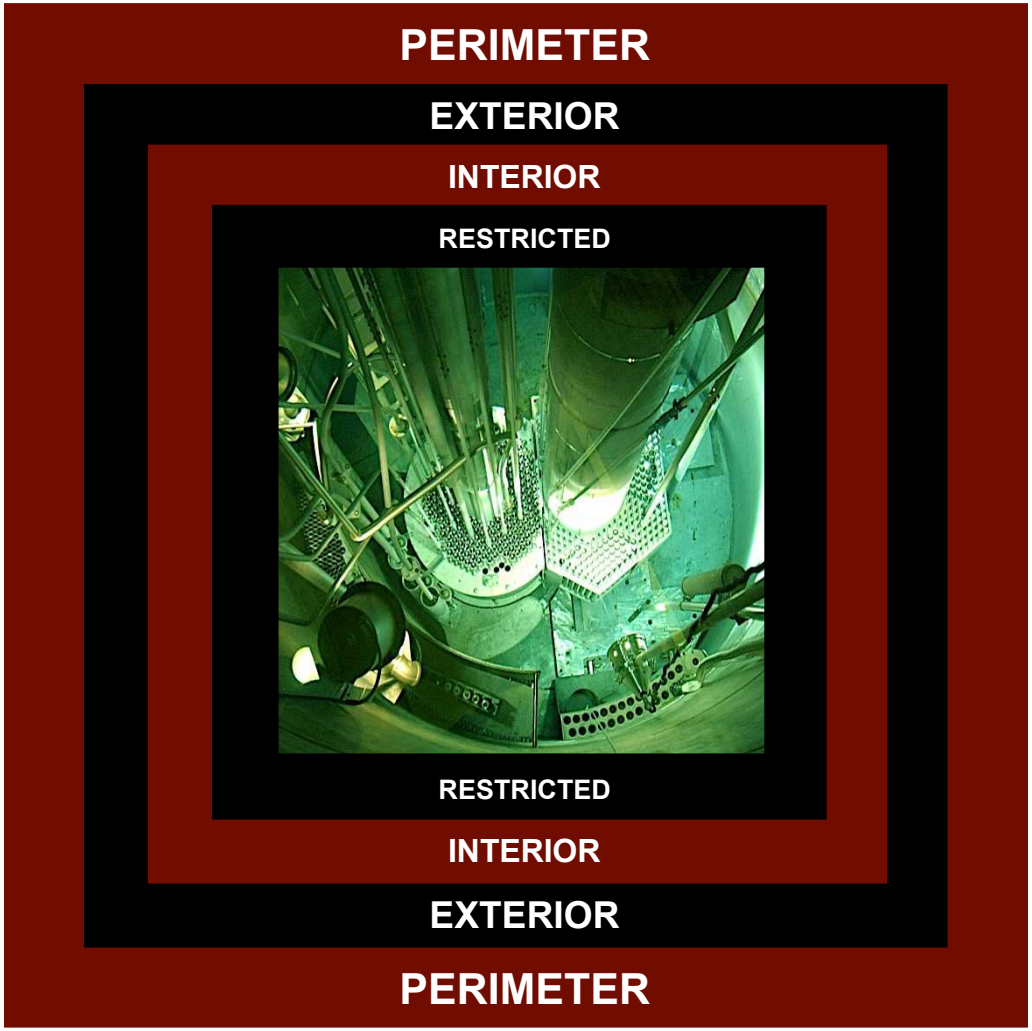
DETECTION



DELAY

Features of Effective Security System

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Balanced Security

- No weak areas

Threat-Based Criteria

- Design criteria describing adversary capabilities

Performance Based Security

- Robustness of security measures
- Integration of Detection, Delay, and Response

Integrated and Effective Security Management

- Entire security effort

Balanced Security

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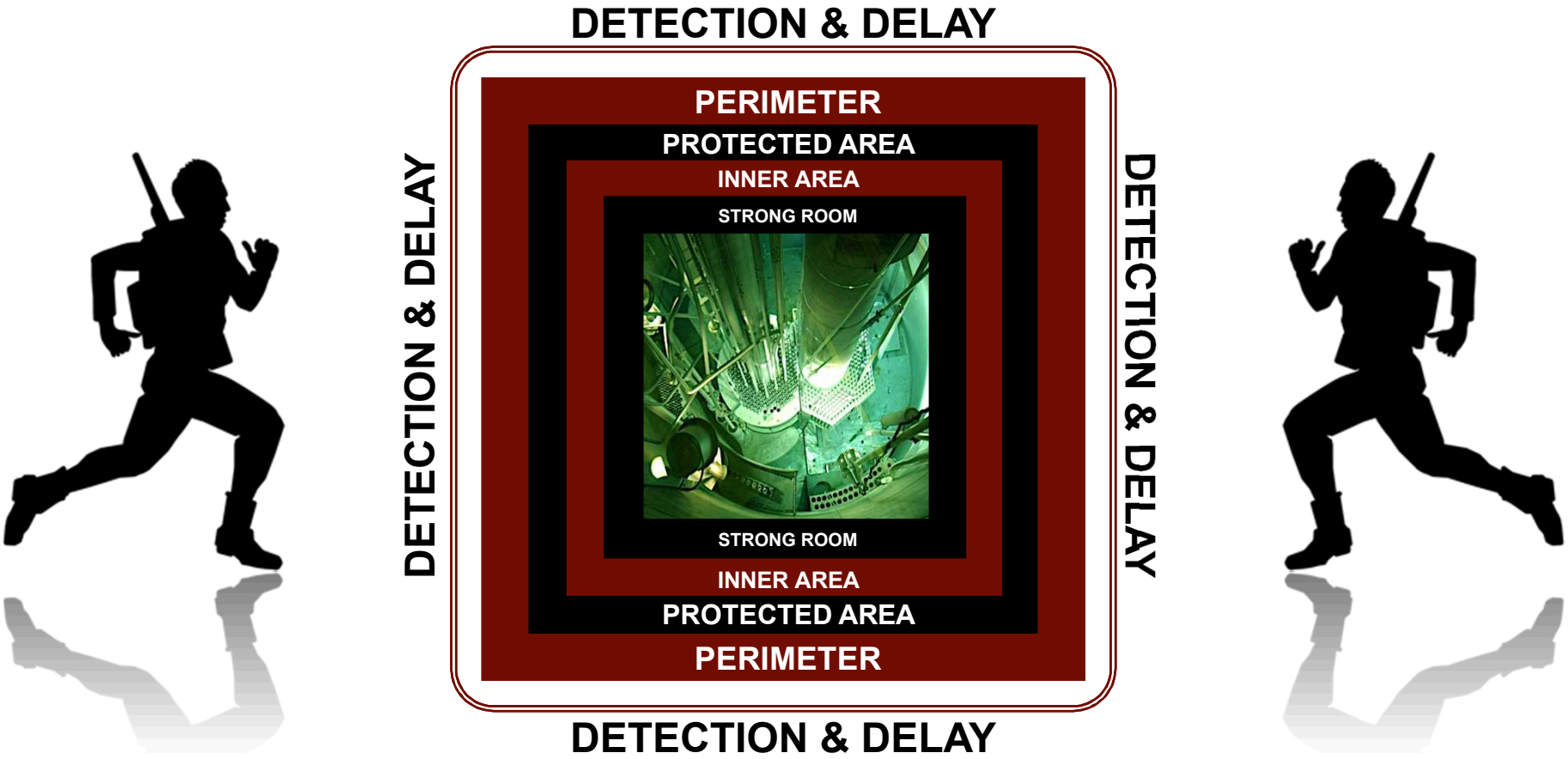
D E T E C T I O N • D E L A Y • R E S P O N S E



Access Control is the the most difficult to achieve in a Balanced Security.

Threat Based Criteria

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- What is the criteria used for security design?
- What is the ability of a sensor to detect an intrusion, or the access delay time of a barrier?
  - Sensor or barrier effectiveness depends on the capabilities and scenario of the adversary.
  - What alarms reliably for one adversary, may NOT alarm for another

A security component is designed for specific adversary capabilities.

Performance Based Security

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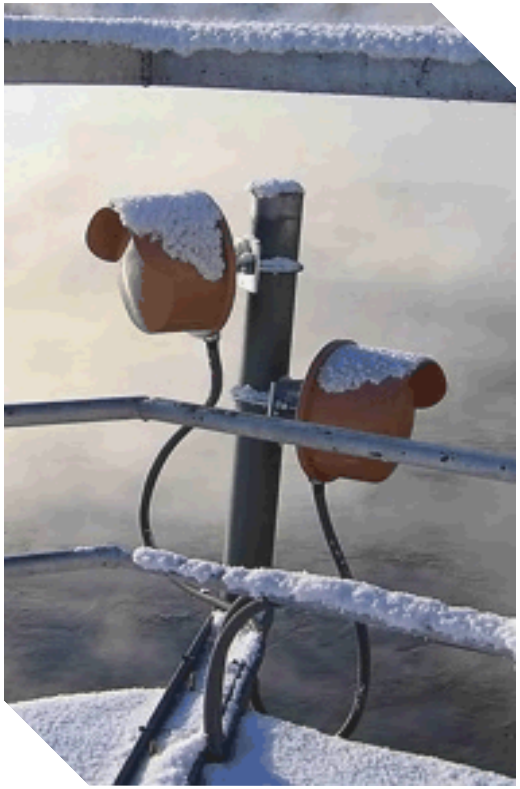
Effectiveness of a detection or delay security measure relates to…

its functionality in the expected environment



its success against the defined adversary

its installation and maintenance quality

Performance Based Security

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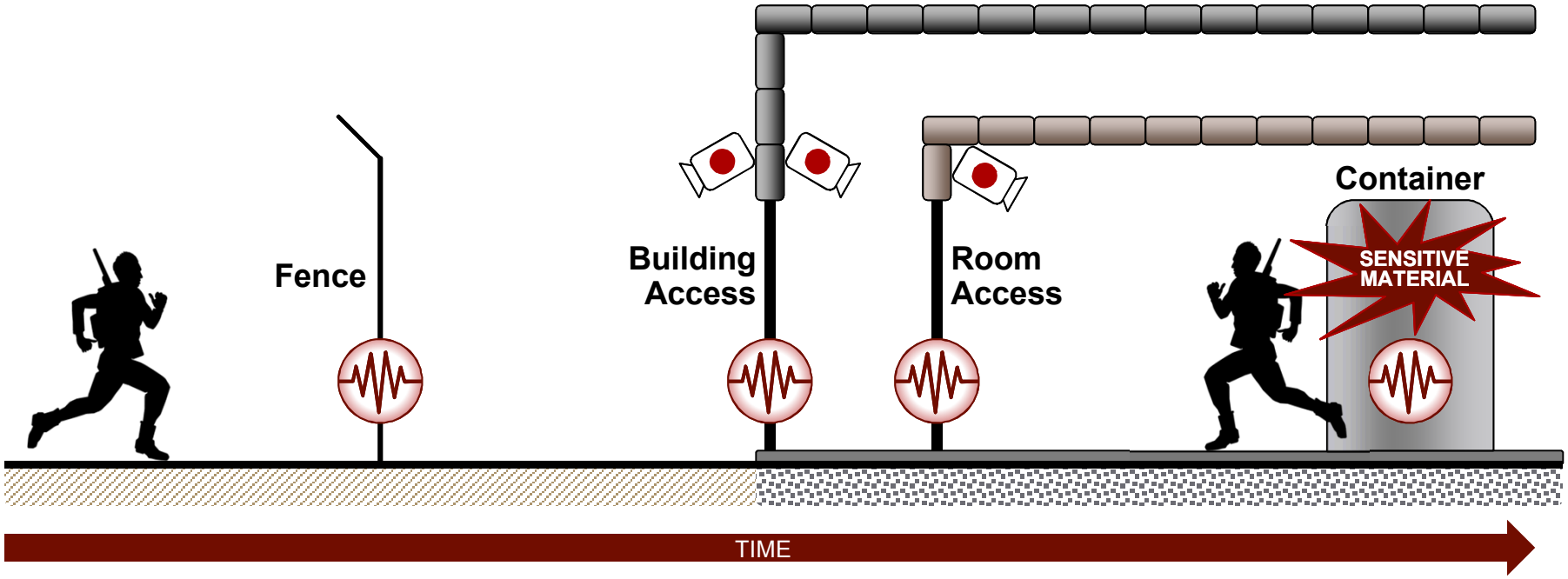
INTEGRATION OF MEASURES

Integration	Timeline	Comparing to response time



Performance Based Security

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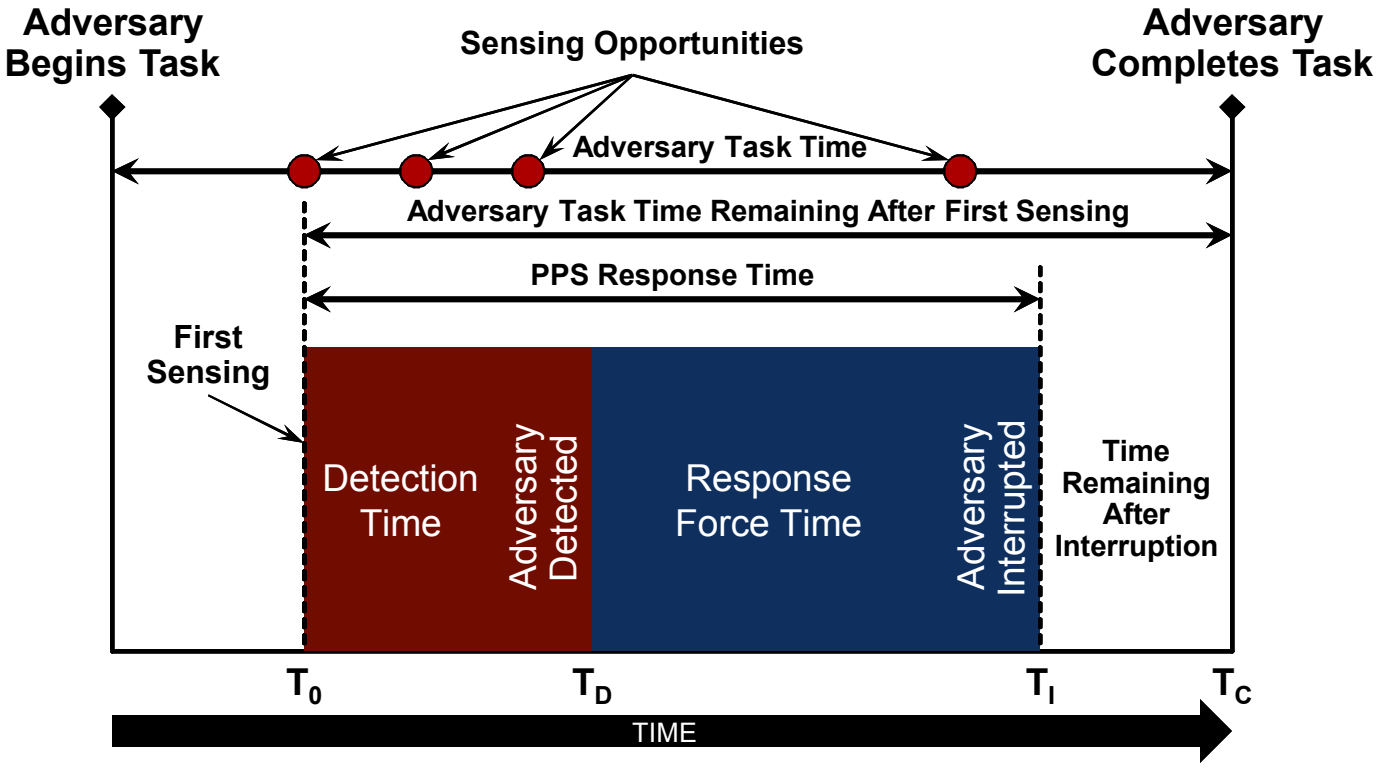
TIMELINE REPRESENTATION

Integration	Timeline	Comparing to response time



Integrated/Effective Security Management

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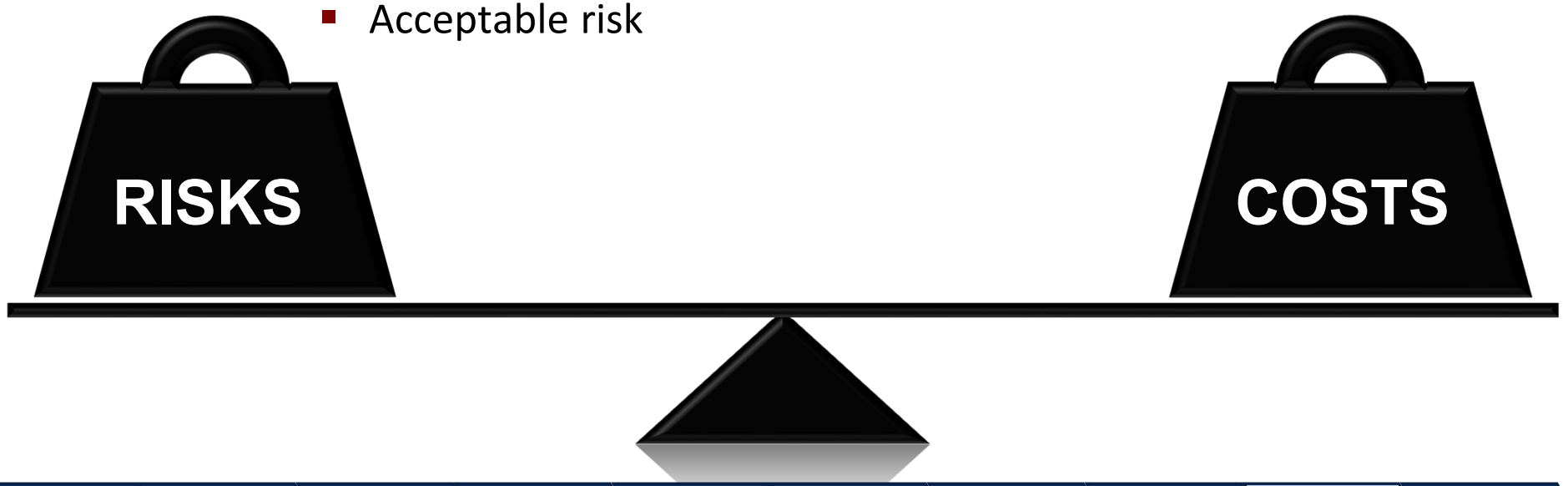
- Security management includes all of the activities and efforts to implement a security regime
  - Developing policies, programs, and plans
  - Overseeing security operations
  - Security training
  - Security system evaluation and maintenance
  - Quality assurance
  - Coordination with site and offsite stakeholders
  - Integration with Information Management System

Nuclear Security Risk Management

- All adverse consequences are not unacceptable
  - Unacceptable consequences require security resources
- All unacceptable consequences are not equal
  - Graded approach
- Likelihood of unacceptable consequences cannot be reduced to zero
  - Acceptable risk



Nuclear Security Risk Management

Risk = Consequence Severity * Consequence Likelihood

Nuclear Security Risk Management

Risk = Consequence Severity * Likelihood of Attempt * Likelihood of Success

Nuclear Security Risk Management

Risk = Consequence Severity * Likelihood of Attempt * Likelihood of Success

Likelihood of Attempt: Can't control attempt

Likelihood of Success: Can control success

Nuclear Security Risk Management

Risk = Consequence Severity * Likelihood of Attempt * Likelihood of Success

Likelihood of Attempt: Can't control attempt

Likelihood of Success: Can control success

Increasing security reduces success likelihood

=

RISK REDUCTION

Summary

- Nuclear Security has objectives in common with Nuclear Safety and with Nuclear Safeguards
- Nuclear Security has evolved over the past 45 years