A Model for Performance Based Method for Designing a PPS

Garima Sharma
Safety and Security Studies Division,
Nuclear Controls and Planning Wing
Department of Atomic Energy, Mumbai, India 400001
Email: garimas@dae.gov.in

Black Swan Event

- Nassim Nicholas Taleb
- A **black swan** is an **event** or occurrence that deviates beyond what is normally expected of a situation and is extremely difficult to predict. **Black swan events** are typically random and are unexpected

- E.g. The WTC event in US on September, 2011.
  - Performance Based Approach

Designing of PPS

- Prescriptive Based Approach
- Performance Based Approach

Prescriptive Based Approach

- *how* PPS should be designed, built, protected, and maintained.
- through guidelines, codes and standards that prescribe (or specify)
  - ➢ *what* is required for protection,
  - ➢ *how these* requirements are to be met,
  - ➢ how compliance is to be *verified*.
- It is based on pre-determined solution.

✓ Design of various devices could be detailed.

✓ Detailing of security provisions are easier to implement.

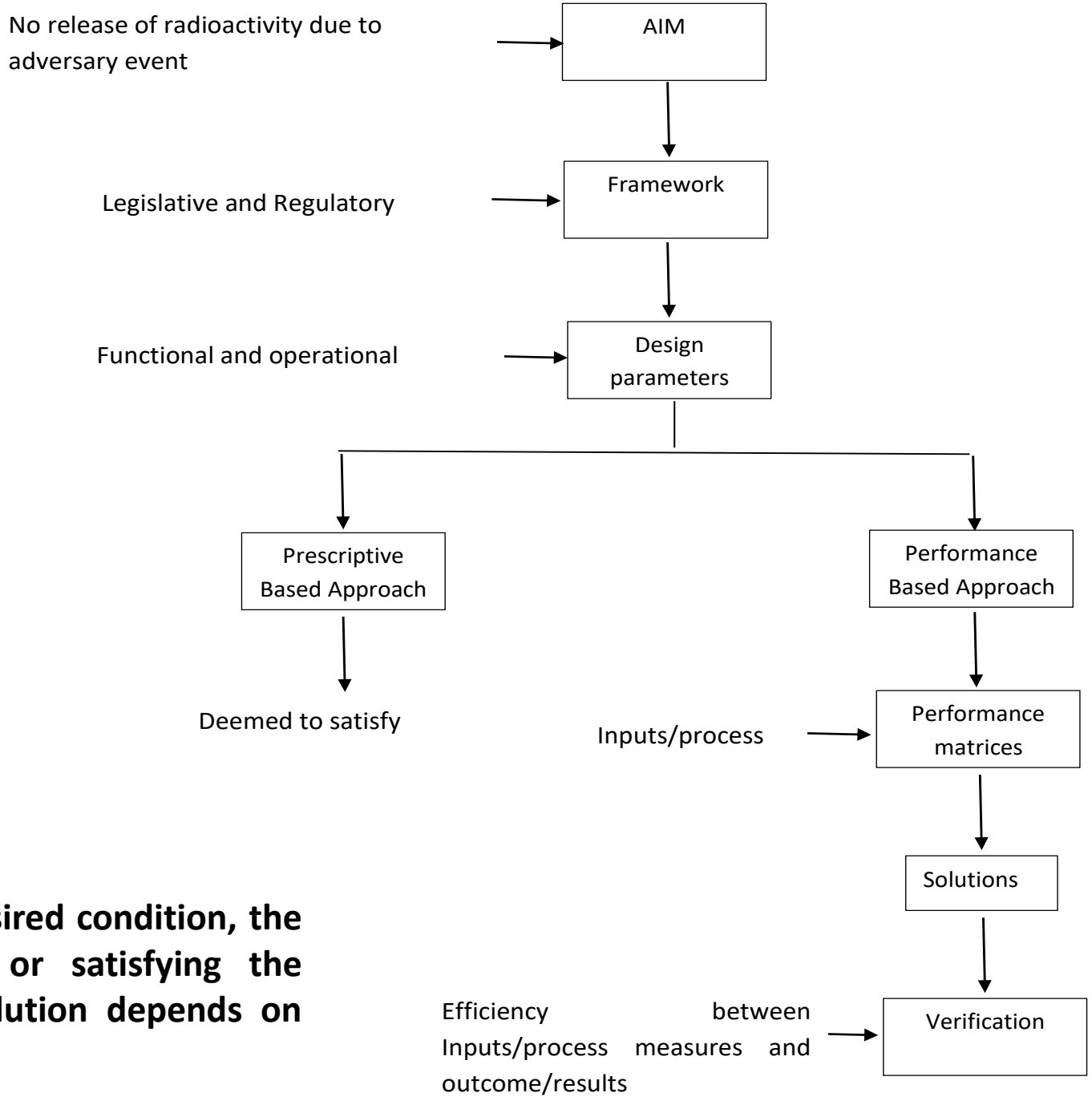
Performance-Based Approach

- It relates the design and performance under certain conditions*;*
  - ➢ *how well* a system performs in defeating a defined adversary with protection in depth concept,
  - ➢*minimum consequence* of component or system failure
  - ➢*balanced protection* based on preset performance objectives.
- Possibility of improving the physical protection techniques to take advantage of the emergence of new concepts and new devices is possible.
- Competent authority or its technical support body should be able to assess the effectiveness of the adopted provisions and to judge the way in which they are applied.

Performance Measures

- Defined time limit: detect an adversary, ensure that the system delay elements are activated fully, sufficient time to response forces to efficiently respond before the adversary completes their tasks
- The time required by the adversary to overcome obstacles should also be determined to decide the difficulty or the performance level of physical barriers required for delay.
- Operator and the regulator should be to assess its effectiveness and vulnerabilities.

A decision making model for designing a PPS

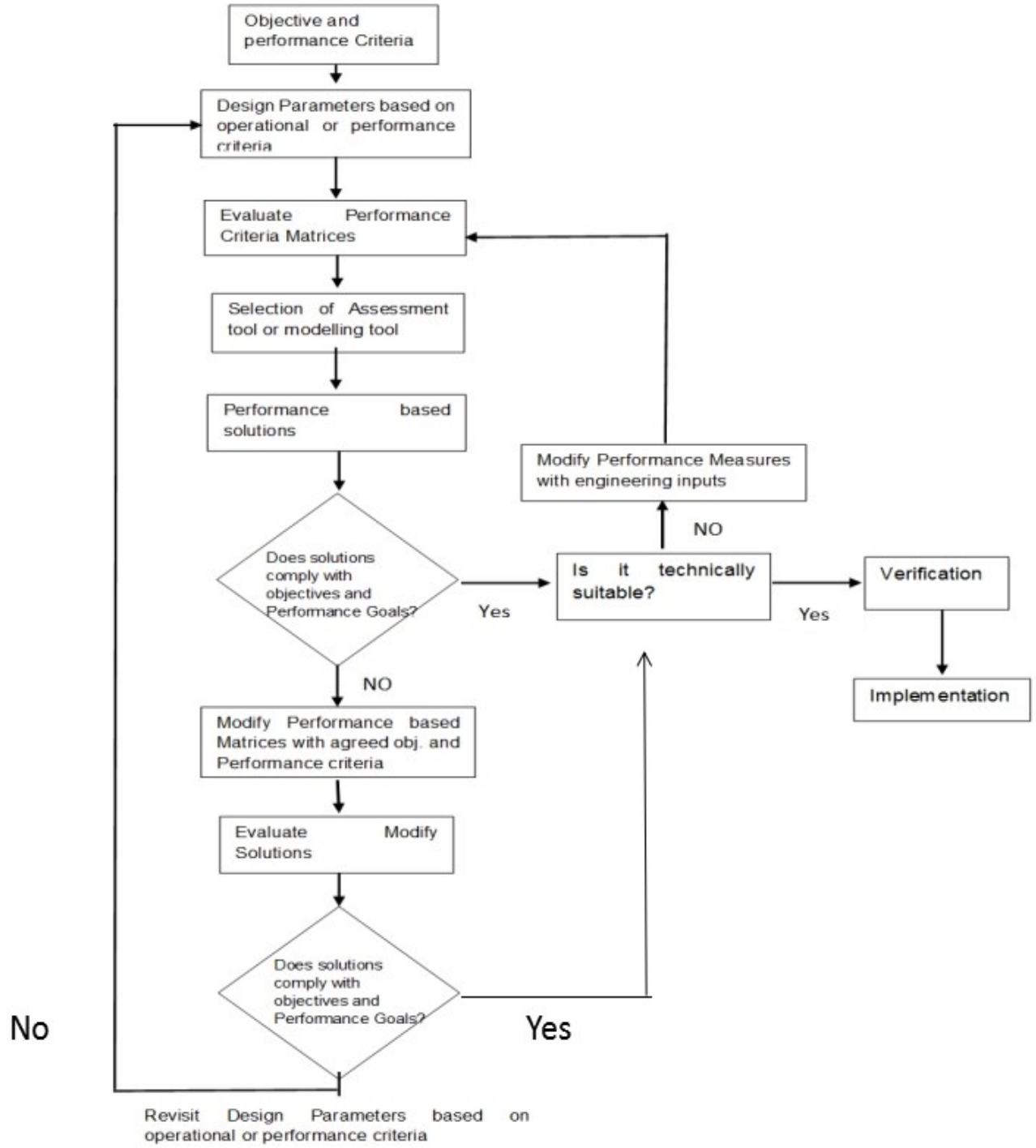


The outcome is a solution to achieve a desired condition, the prevention of an undesired condition, or satisfying the acceptance criteria. Effectiveness of a solution depends on inputs/processes and outcomes/results.

Fundamental Pillars For PBS

- Regulatory framework to integrate aims, functional and operational objectives of PPS, and performance requirements of physical protection;
- Selection of nuclear security standard procedures, security guidelines, and best practices, that can be used for screening most suitable and optimized methods for complying with an overall objectives; and
- Assessment and modelling tools for developing, reviewing, and verifying the designed PPS in accordance with operational and regulatory requirements.

An Iterative Model for Performance Based Method



Example for Performance Matrices

Transport of NM

- Complete knowledge of geographical terrain, vunerable areas
- Communication channels, Transport support cell
- Security of information regarding routes and schedules
- Coordination among the different levels and jurisdictions of state, and local authorities.
- Special security provisions like panels, armour, NM vault, two person criteria
- Withholding tactical information about where mobile detection systems, communication systems so that the presence or absence of the capability at a particular time cannot be determined with certainty by an adversary.

With the increase in Nuclear Threat globally, Performance Based Approach is a necessity

Thank You

Performance Criteria

- Detection: alerts or signal the presence of adversary through (n) no of different ways; includes the assessment time.
- Delay: Delay the progress of an adversary for response to take place, should be effective immediately after detection with minimum response time;
- Response: Well-equipped and trained personnel to control the adversary in minimum time, n no. of response forces (on site guards, off-site police or military personnel).

- Nuclear security mandates the implementation of robust physical protection for the nuclear material and/or nuclear facilities.
- The objective of physical protection regime is the prevention of a malicious act by means of deterrence and by protection of sensitive information, management of an attempted malicious act or a malicious act by an integrated system of detection, delay, and response and mitigation of the consequences of a malicious act.
- An effective PPS requires procedures, systems and personnel working in complete coherence to perfectly neutralise threat or sabotage of any form or dimension.