PART I. SAFETY FOUNDATIONS AND PLANNING

1. Safety Leadership and Culture
2. Safety planning and operational controls
3. Fatal risk prevention framework
4. Hazard Indentification Risk

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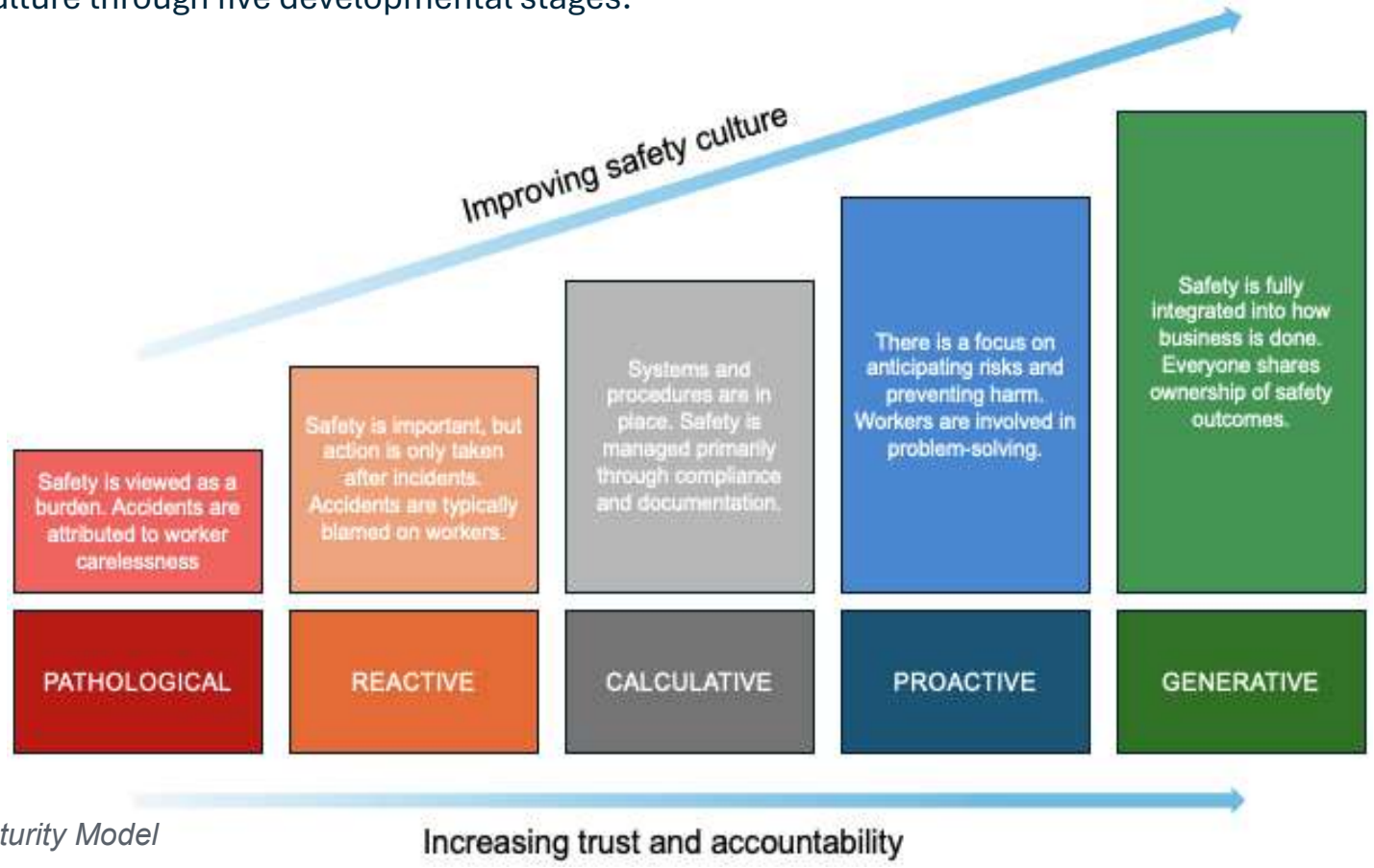
01. Safety Leadership and Culture

Safety culture maturity model

Creating a safe working environment requires a strong safety culture embedded in values and behaviors, not just rules. In large infrastructure projects, this is both an ethical and contractual priority. The Safety Culture Maturity Model (SCMM) helps assess and improve safety culture through five developmental stages.



Safety Culture Maturity Model

Source: Aninver based on HSE

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01. Safety Leadership and Culture

Leadership commitment

Strong leadership is key to a strong safety culture and is both a moral and contractual obligation under ESS2 and ESS4. Leaders must show visible commitment through resources, integration of OHS, and clear accountability. This is enforced via contracts, performance reviews, and signed Codes of Conduct with consequences for non-compliance.

This commitment can be demonstrated through:

- Adequate financial and human resources.
- Integration of OHS in procurement, design, and execution processes.
- Establishing clear safety KPIs.
- Regular site visits and safety walks.
- Ensuring that investigations lead to learning, not punishment.

Leadership commitment

Source: Aninver based on HSE

01. Safety Leadership and Culture

Accountability

Is the obligation or responsibility to explain, justify, and take ownership of one's actions and decisions, often with the expectation of being answerable to others for the outcomes.

Shared ownership: Safety must be owned by the entire workforce.

Worker representation: Establish safety committees or stewards who regularly engage with management.

Comprehensive training: Provide technical and participatory training for all workers.

Right to refuse: Ensure workers can decline hazardous tasks without fear of retaliation.

ACCOUNTABILITY

Source: Aninver

02. Safety planning and operational controls

Permit-To-Work (PTW) systems

PTW systems serve as a **communication bridge between management, supervision, and operational teams**, confirming that all parties understand and accept the risks involved. There are 7 key aspects affecting PTWs:

Source: Health and Safety Executive (HSE). Permit to work systems.

02. Safety planning and operational controls

Exclusions zones and guarding

Exclusion zones are clearly marked restricted areas designed to protect individuals from site hazards like falling objects, moving equipment, or live electricity. Their size and type depend on task risk, and must follow ISO or national standards for barricades, signage, and colour coding.

Figure 8: Typical exclusion zone signalling

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02. Safety planning and operational controls

Exclusions zones and guarding

Exclusion zones protect workers and the public by restricting access to hazards through hazard assessment, clear communication, physical barriers, and trained personnel:

Hazard identification: Establish exclusion zones by thoroughly identifying and evaluating site-specific hazards like

Physical barriers and access control: Implement robust physical demarcation to prevent unauthorized or accidental entry.

Clear communication: Use standardized, multilingual signage, ground markings, alerts, and safety briefings.

Consistent training: Provide ongoing training so all personnel recognize, respect, and follow exclusion zone protocols.

Figure 9: Typical exclusion zone signalling

Source: Aninver

02, Safety planning and operational controls

Do’s and Dont’s in exclusions zones and guarding

DO’S	DONT’S
Clearly mark exclusion zones with fencing, cones, and signage.	Don’t allow unauthorized access into exclusion zones.
Conduct toolbox talks daily highlighting zone locations.	Don’t change exclusion zones without updating communication.
Use mobile barriers or flagging for dynamic works.	Don’t rely only on signage without physical barriers.
Inspect barriers for integrity and reposition as necessary.	Don’t use faded, damaged, or improperly placed tape.

Do’s and Dont’s Exclusions zones and guarding

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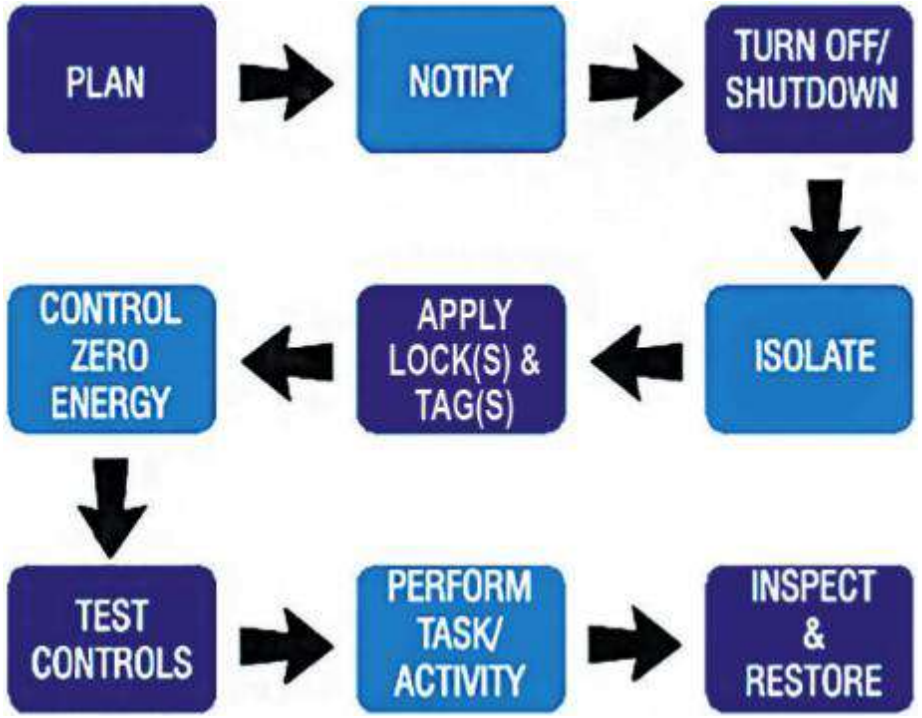
02. Safety planning and operational controls

Lock-out/Tag-out (LOTO) and energy isolation

Lock-out/Tag-out (LOTO) and energy isolation procedures protect workers from hazardous energy release during equipment maintenance. Proper isolation of electrical, mechanical, hydraulic, and other energy sources is crucial to prevent fatal accidents like electrocution or crushing.

Lock-out, refers to the physical placement of a lockable device (e.g., padlocks, hasps) on the energy-isolating mechanism (such as a circuit breaker, valve, or switch) to hold it in a "safe" or "off" position.

Tag-out, involves attaching a clearly visible warning label to the same device, indicating that it must not be operated until the tag is removed by the authorized person who applied it.



Steps of a safe LOTO procedure
Source: Aninver

02. Safety planning and operational controls

Emergency response and incident management

Construction sites face constant risks due to their dynamic nature, making a comprehensive **Emergency Response Plan (ERP)** essential to protect workers, the public, and responders.

An effective ERP prepares for various emergencies—from falls and fires to natural disasters—by defining roles, responsibilities, and communication protocols. It must be tailored to the specific site and involve all stakeholders, including contractors and local authorities.

Source: Aninver

02. Safety planning and operational controls

Emergency response and incident management

Emergency preparedness starts with creating a project-specific ERP tailored to the work, site, hazards, and risks. The plan clearly defines roles, responsibilities, and communication for all staff levels and integrates contractors and local authorities when needed. Key components of an ERP include:.

Clear chain of command for activating the emergency plan and notifying key personnel.

Defined emergency scenarios with specific response actions (e.g., fire evacuation, rescue, medical, hazardous material).

Site layout maps highlighting evacuation routes, assembly points, safety equipment, and emergency exits.

Communication protocols using public address systems, radios, alarms, and backups.

Coordination with external services like fire departments, hospitals, and local authorities.

Source: Aninver analysis based on best practices

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02. Safety planning and operational controls

Emergency response and incident management

When an incident occurs, a quick and efficient response is essential not only to protect lives but also to support the incident investigation process. Proper emergency action helps:

- Prevent the situation from escalating;
- Shield workers and the public from further danger or injury;
- Deliver first aid to the injured (if safe to do so);
- Protect materials and critical equipment from further damage; and
- Secure the incident area to preserve evidence for investigation.

Source: Aninver

02. Safety planning and operational controls

Do’s and Dont’s in Emergency response and incident management

DO’S	DON’T’S
Develop a site-specific Emergency Response Plan.	Don’t rely on generic templates for all sites.
Train all personnel through regular emergency drills.	Don’t skip emergency drills or view them as low-priority.
Define roles for all emergency responders and site staff.	Don’t assume roles will be understood without clear assignment.
Report and escalate all incidents and near-misses immediately.	Don’t ignore or underreport minor incidents.
Preserve incident scenes for investigation.	Don’t disturb the site until a full investigation is done.
Develop a site-specific Emergency Response Plan.	Don’t rely on generic templates for all sites.

Table 5: Do’s and Dont’s in emergency response

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03. Fatal Risk Prevention Framework

Life-saving rules in construction sector

Fatalities in construction are often preventable with a strong Fatal Risk Prevention Framework. Life-Saving Rules define essential safety behaviours for high-risk tasks, improving training and compliance. These rules are globally adopted and embedded in national safety standards to ensure consistent protection.

Figure 6: Example of typical Life-Saving Rules in the construction sector

Source: Energy safety Canada

03. Fatal Risk Prevention Framework

Life-saving rules in construction sector

Identifying and managing critical risks is essential to preventing fatalities and serious injuries on construction sites. These high-severity hazards require targeted attention, structured assessment processes, and verified controls to ensure safety measures are not only planned but actively working in real conditions.

Key Highlights

1. Critical risks can lead to fatalities or life-altering injuries and must be prioritized over general hazards.
2. High-risk activities in construction include working at height, around machinery, lifting operations, excavation, confined spaces, and live electricity.
3. A Critical Risk Register is essential and should be updated throughout the project.
4. JHAs and FLRAs help assess evolving on-site risks in real time.
5. Worker participation through toolbox talks and near-miss reporting strengthens risk awareness.
6. Critical controls must be verified regularly to ensure they're implemented and working effectively.

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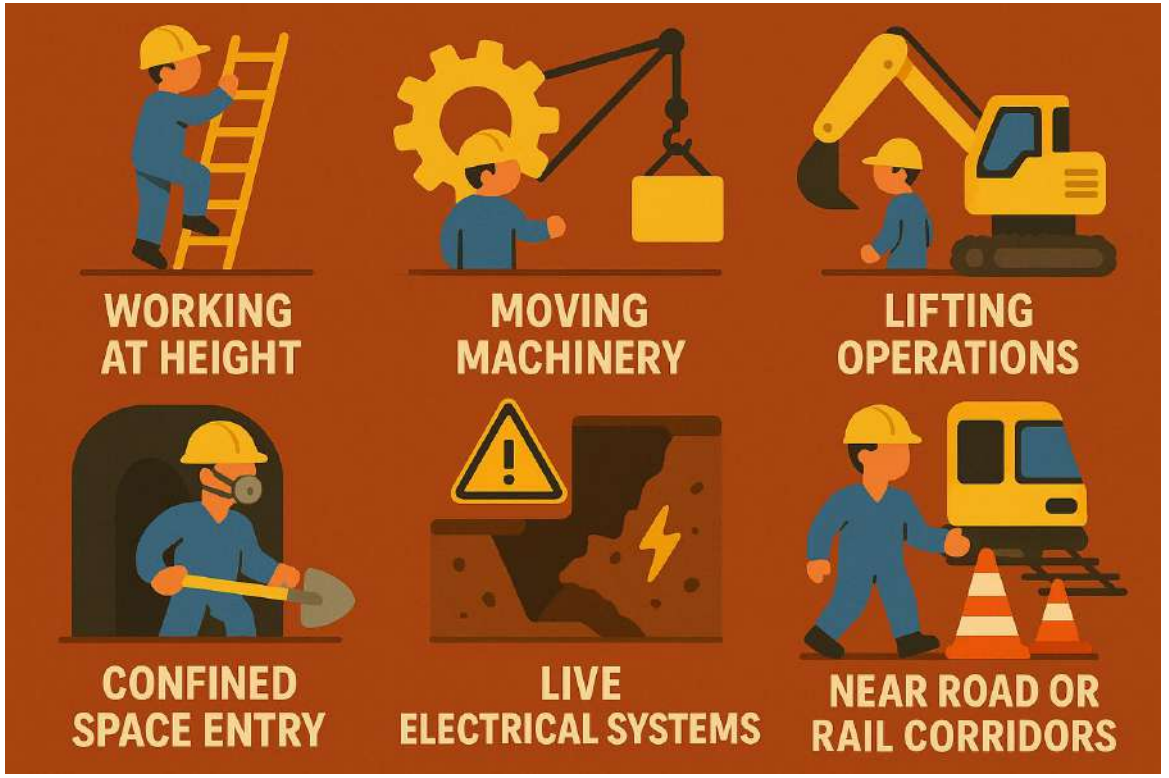
03. Fatal Risk Prevention Framework

Crtical Risk identification

Critical risks are defined by their potential to cause fatalities or serious, life-altering injuries, regardless of how frequently they occur. Identifying these risks is a foundational element of any effective OHS strategy. Unlike general hazards, critical risks are distinguished by their severity, situations where a single lapse or failure can result in catastrophic consequences.

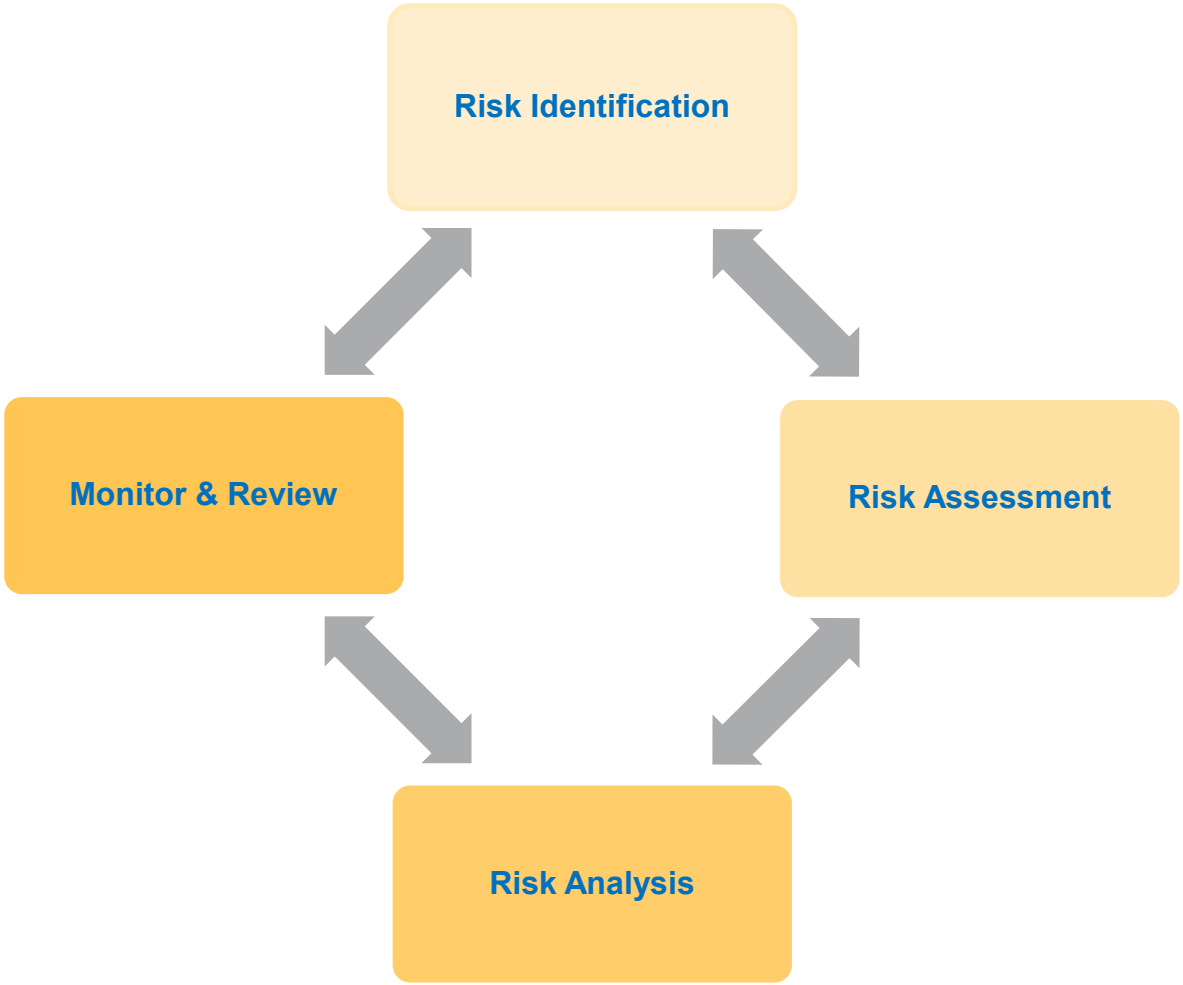
Potential Risk activities



Source: Energy safety Canada

03. Fatal Risk Prevention Framework

Figure 1: Key components of a proper HSE management plan



Source: Aninver analysis

Hazard Identification and Risk Assessment (HIRA) assessment

A well-functioning HIRA ensures safe and healthy working conditions throughout all project phases by providing a structured approach to hazard identification, risk management, safety monitoring, and continuous improvement, aligned with international best practices.

03. Fatal Risk Prevention Framework

HAZARD	POTENTIAL IMPACTS	LIKELI-HOOD	RISK LEVEL	CONTROLS
 Hot works and electrical safety	Burns, electroution, respiratory harm	MODERATE	EXTREME	Permit system, fire watch, PPE, equipment isolation, training
 Demolition and structural instability	Uncontrolled collapse, falling debris	MODERATE	MAJOR	Engineering survey, controlled demolition, PPE, debris netting
 Soil stability and climate considerations	Soil erosion, flooding, slope failure	UNLIKELY	MODERATE	Slope reinforcement, drainage control, weather monitoring
Soil stability and climate considerations	Injury due to instability, erosion, or waterlogging	MODERATE	MODERATE	LOW

Hazard Identification and Risk Assessment (HIRA) assessment

All incidents should be assessed based on their potential risk, not just actual outcomes. Near-misses or incidents without injuries still warrant full investigations and root cause analyses if they had the potential for serious harm, to ensure corrective actions and prevent recurrence.

Source: Aninver based on the National Institute for Occupational Safety and Health (NIOSH)

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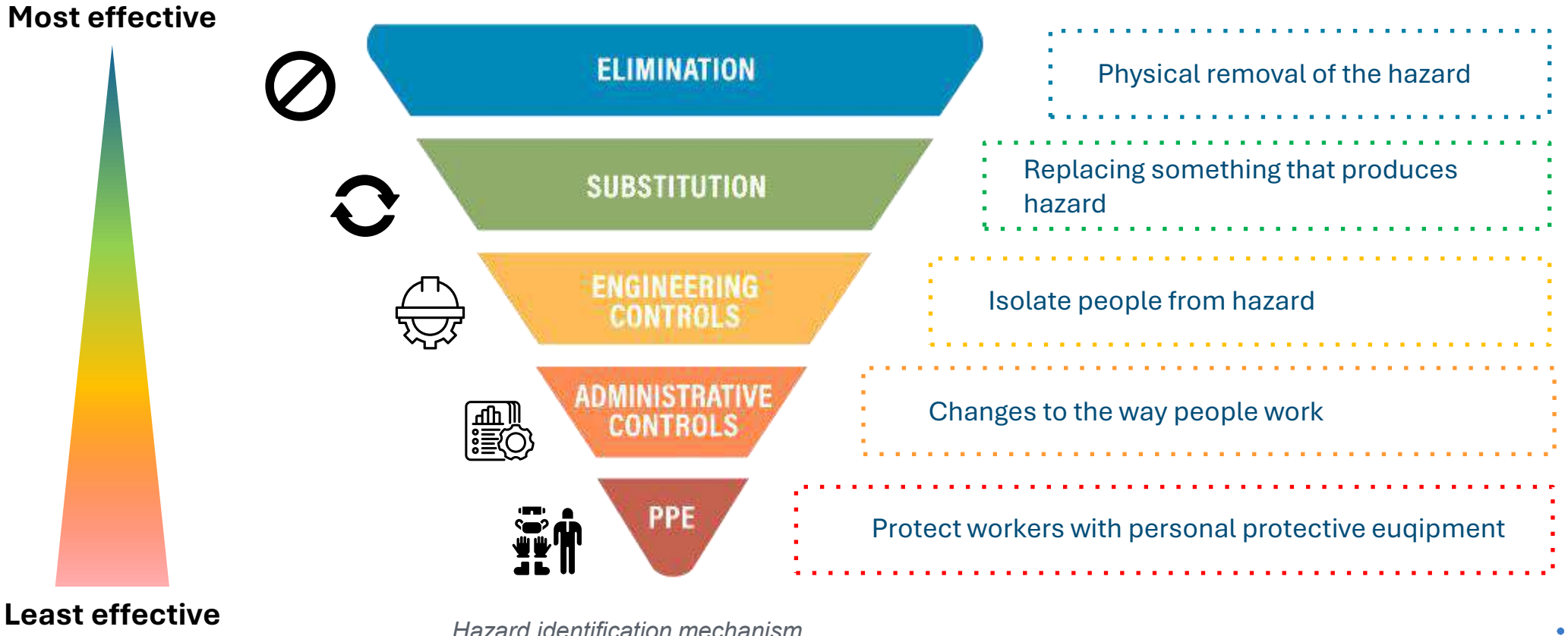
03. Fatal Risk Prevention Framework

Hazard identification and Risk Assessment

The hierarchy of controls is a globally recognized approach to risk mitigation, ranking measures by effectiveness. Elimination is most effective, followed by substitution, then engineering controls to isolate hazards. Administrative controls come next, relying on human behavior, while PPE is the least effective and should only be used as a last resort.



Hazard identification mechanism

Source: Aninver based on the National Institute for Occupational Safety and Health (NIOSH)