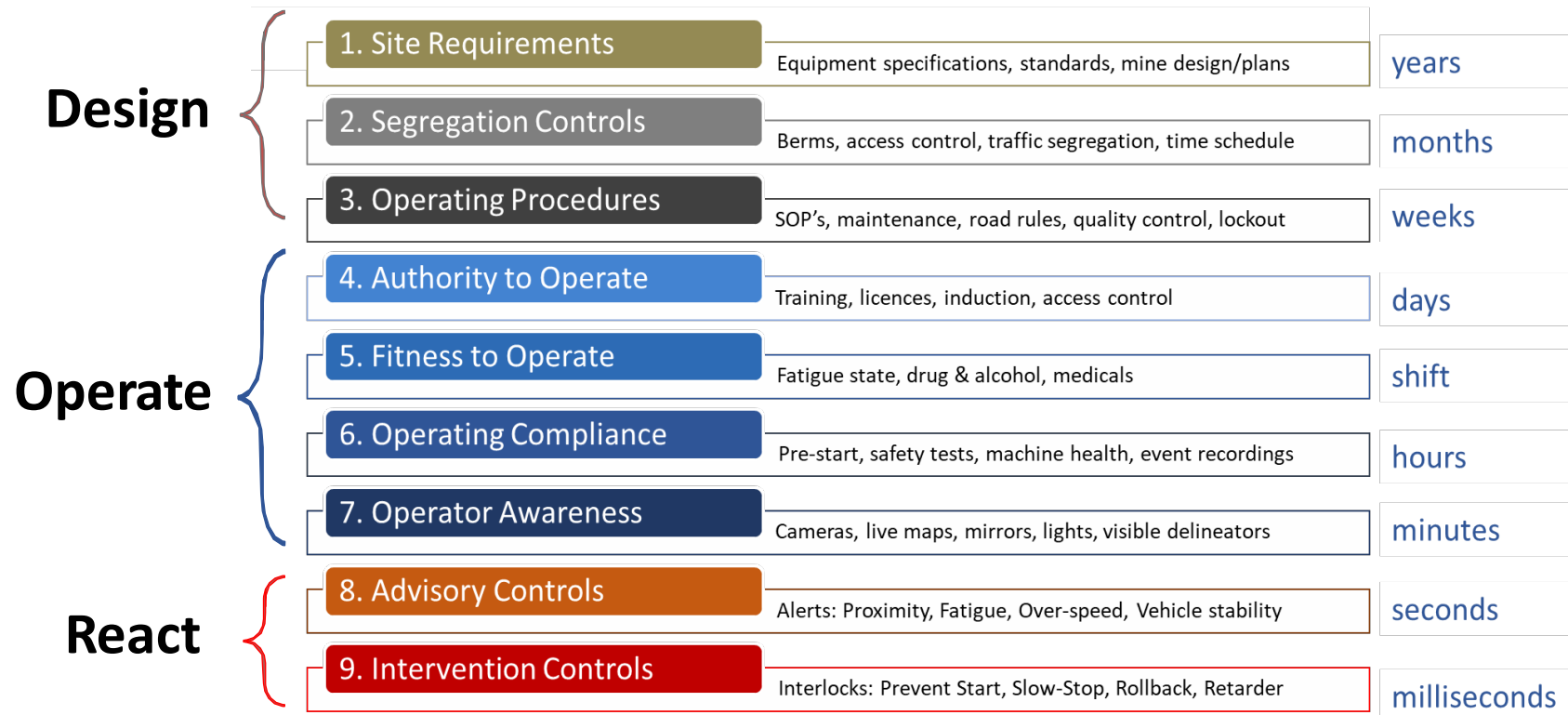


# Key Concepts – The EMESRT Nine Layer Control Effectiveness Model

*Reframing our understanding of Vehicle Interaction Controls*

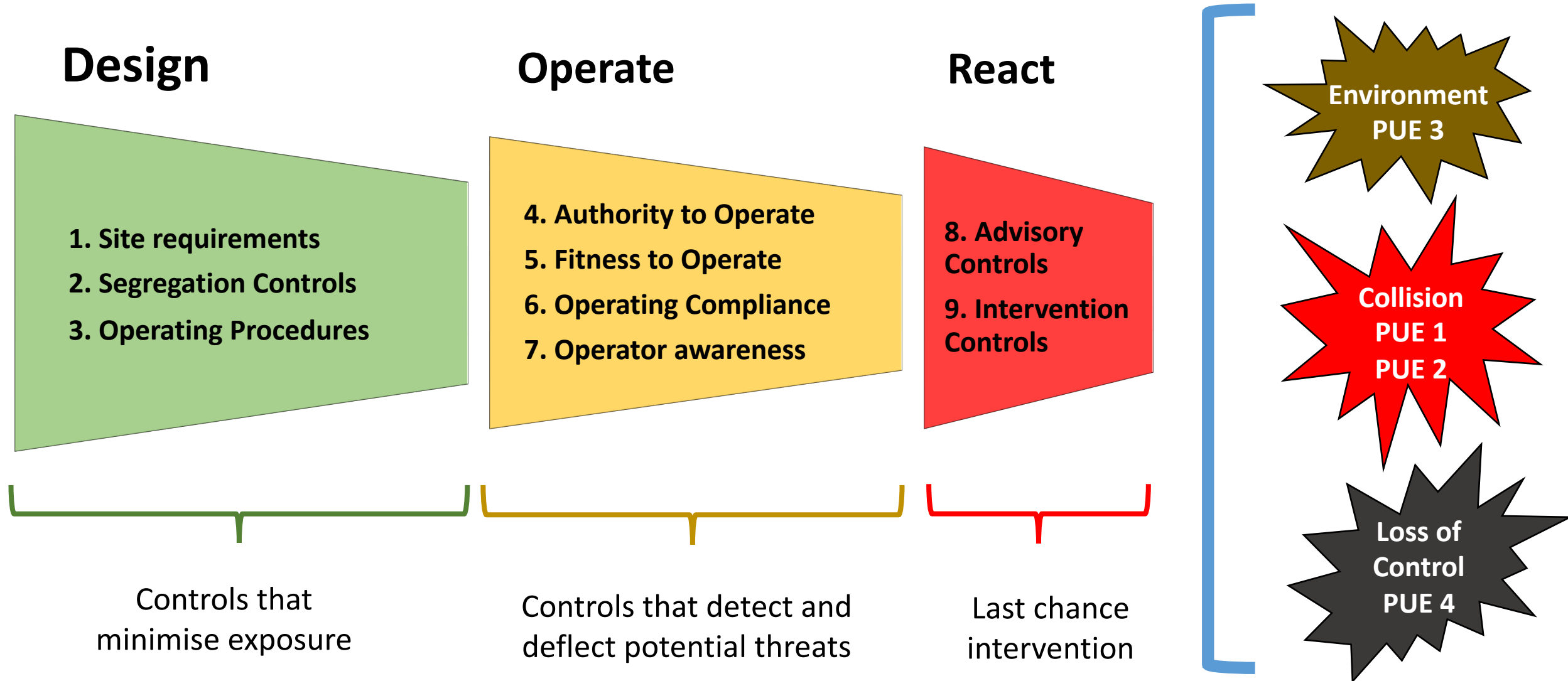
## Strategy Relevance

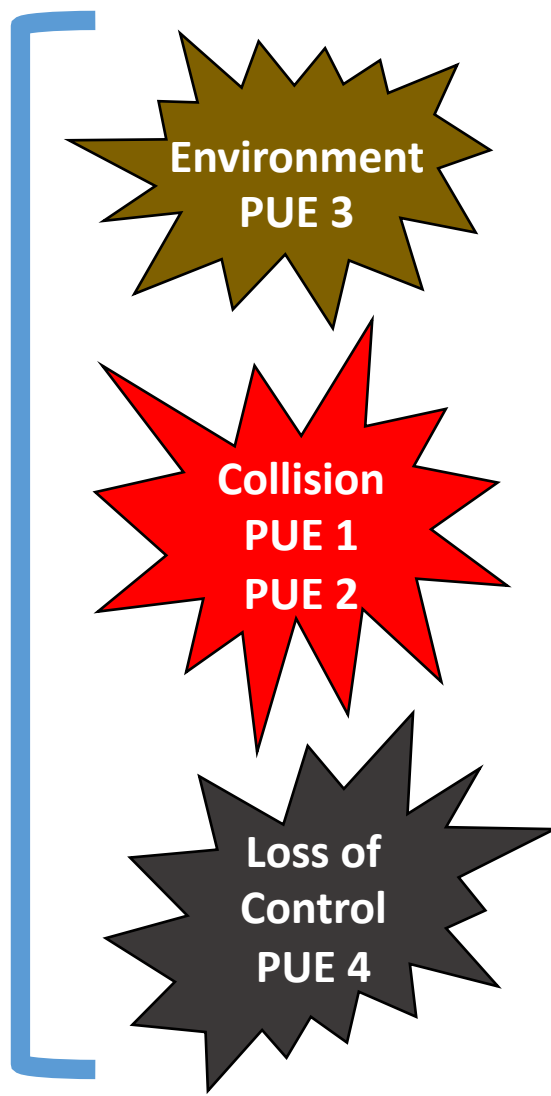
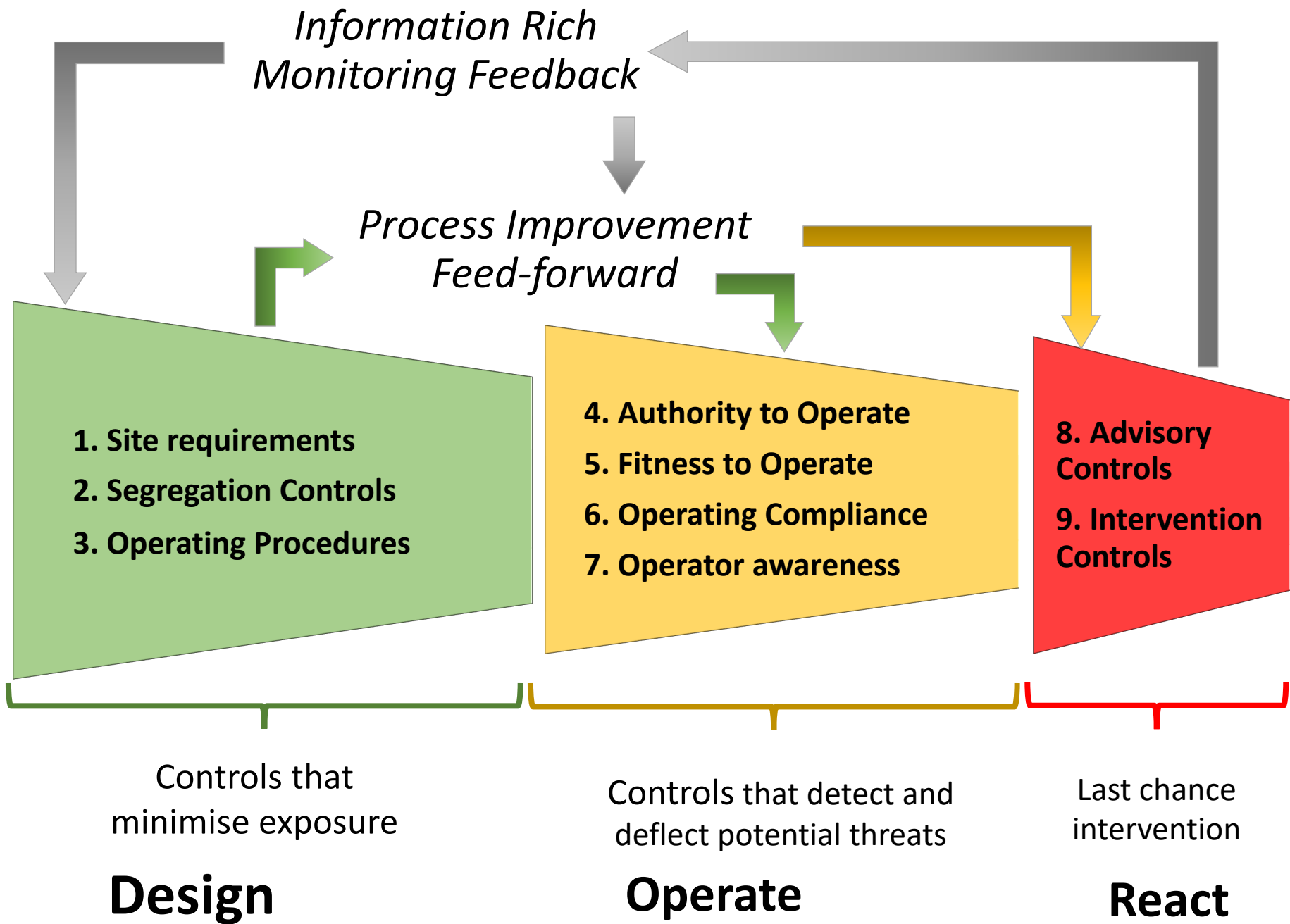
- A foundation concept
- Dynamic interdependence between control levels
- Control categories operate in different timeframes
- High dependence on real time human factor decision making
- To implement Level 8 and 9 controls well, you need to first understand your Level 1- 7 control baseline



# Foundation Concept

The EMESRT Nine Layer Model of Control Effectiveness *Time phased prior to a Vehicle Interaction Incident (all PUE outcomes)*

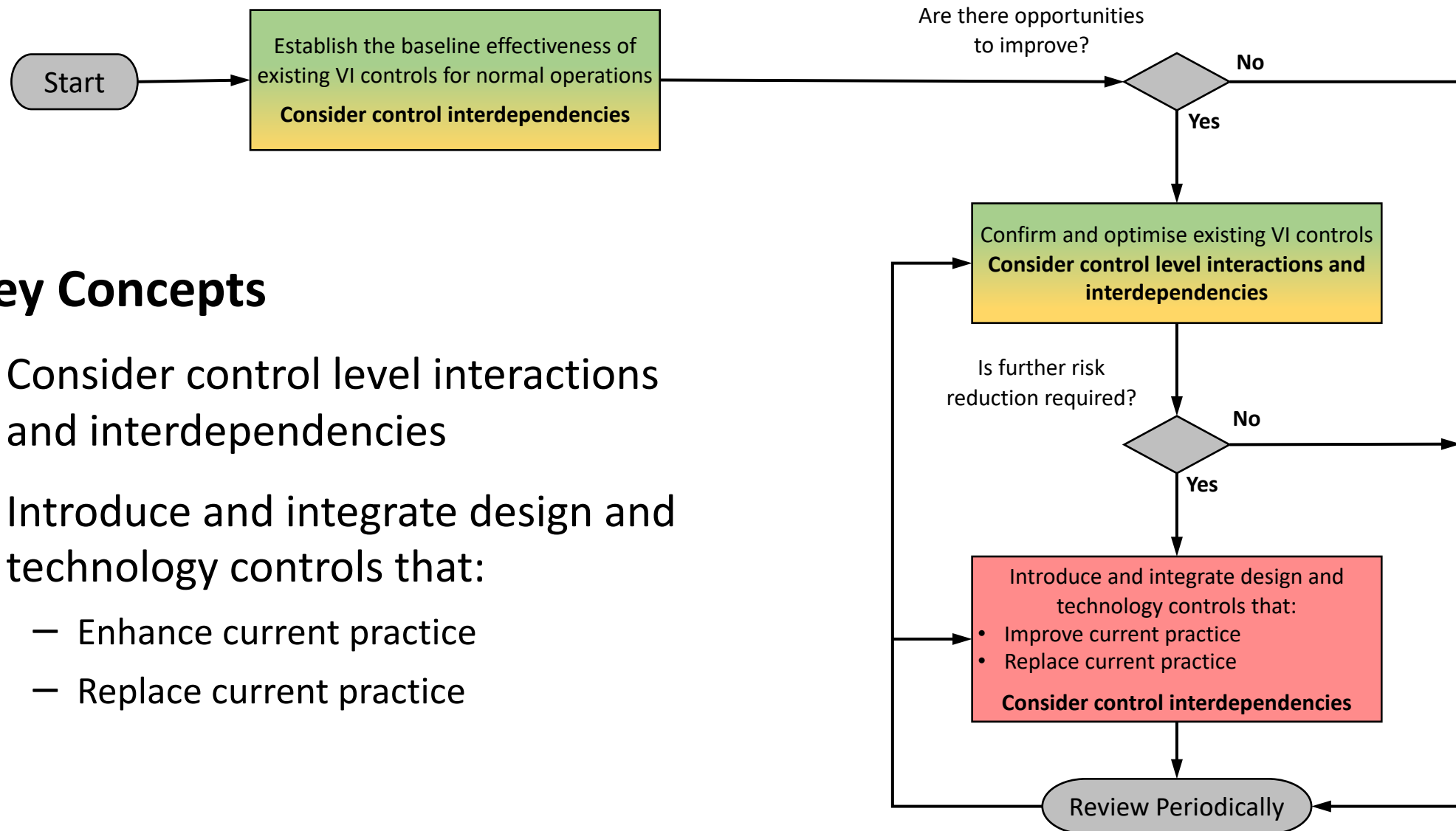




# 2020 EMESRT General Industry Project Delivery

## Key Concepts

- Consider control level interactions and interdependencies
- Introduce and integrate design and technology controls that:
  - Enhance current practice
  - Replace current practice



**Project Commencement**  
Assign an Executive Sponsor  
Appoint a Project Leader  
Establish a site project team

**Confirm Project Scope and Expected Outcomes** based on 'Company' Strategy

Review and adapt Industry Resources  
Document 'Company' Vehicle Interaction (VI) Control Improvement intent and process that will be deployed at the operating site

**Operating Site - Baseline (Phase 1) and VI Control Gap Close (Phase 2)**

**Vehicle Interaction Control Effectiveness (VICE)**  
Review **Baseline Process** at Operating Site

Map 'Company' VI Standards	Input site characteristics e.g. open cut UG mine, refinery, equipment in use, process, location, workforce etc.
Confirm site relevant <b>Credible Failure Modes</b>	Allocate <b>Business Input</b> questions to relevant roles
	Map ' <b>work as documented</b> ' answers to CFw Business Inputs

**Review, update and validate** VI Control Effectiveness Baseline at workshop with supervisors and the workforce '**work as done**'

**Close gaps** in current site Business Inputs for VI Controls (improve reliability)

**Operating Site - Existing VI Control Enhancement (Phase 3)**

Reference relevant **Functional Performance Scenarios** (industry resource adapted by 'Company')  
Confirm site relevant VI control improvement opportunities  
Prepare User Requirements

Identify new '**Design**' control improvements (including technology)

Identify new '**Operate**' control improvements (including technology)

Review alignment of 'Company' VI technology options against Site User Requirements

Identify the range of 'Company' preferred mature VI technology options appropriate for site

Review Control Framework for effect on and integration with existing '**Design, Operate and React**' VI controls

Confirm best site fit for new '**React**' VI control improvements (based on technology)

**Operating Site - Existing Project Management Processes**

Project Scoping and Cost Estimate

Consult and engage with supervisors and the workforce

New VI control validation in an operational environment (technology performance validation)

Production deployment of new VI control, including ongoing maintenance inputs

Project Timing

Project Resourcing (including digital infrastructure)

**Operating Site - New VI Control Implementation (Phase 4)**

**'Company' Vehicle Interaction Control References and Resources**

- Company mature VI Technology summary (technology and commercial readiness)
- Company User Requirements (combining Functional, Performance and Technical requirements)
- Company Project Management approaches
- Company 'mine of the future' digital strategy

Update '**Company**' VI Control References and Resources  
Provide **Industry feedback** on application of processes and updates to Functional Performance Scenarios.

**Industry Vehicle Interaction Control References and Resources**

- ICMM ICSV Vehicle Interaction Working Groups
- ICMM Knowledge Hub – White Papers, Case Studies,
- EMESRT Vehicle Interaction Knowledge Hub
- EMESRT VI Control Improvement Resources - Guideline, WBS, Work Packages, tools, etc.
- EMESRT Functional Performance Scenarios (Surface and Underground Mining)
- ISO Standards and other key references e.g. PDS validation protocol

**Site Vehicle Interaction Control Improvement Project Outcomes**

**EMESRT Levels 1-3**  
Operationally Integrated **Design** Control Improvements

**EMESRT Levels 4-7**  
Operationally Integrated **Operate** Control Improvements

**EMESRT Levels 8-9**  
Operationally Integrated **React** technology that is aligned with company Digital Strategy