

### Pragmatic adoption of the IEC 61511 lifecycle Lourens du Plessis Process safety conference 2024



### Lourens du Plessis

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# Why an IEC 61511 standard for SIS?

### **Electronic type** devices

### Technology before 1980's

### Hardware components

- Few components
- Predictable failure rates



Source: Wikimedia Commons

### Software configuration

- Limited settings
- No diagnostics





# Why an IEC 61511 standard for SIS?



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### **Technology** after 1980's

Failure modes & diagnostics Memory & microchips No pre-defined failure rates

Validation & testing

• Fully configurable • Extensive diagnostics

## **Brief overview of the** specification

- Outcomes based with limited prescriptive requirements
- Functional Safety Lifecycle for different activities
- Design standard to Safety Integrity Level 1 to 4
- Analytical approach to risk management





**Concept &** planning Modify Delate naintate 5 4



# The situation with a legacy SIS

Facility is designed to different "legacy" industry standards

No clear description of original safety requirements, but:

- Alarm and trip test lists
- Introduced improvements from cyclic hazard and risk assessments.
- Identified and corrected deficiencies through root cause analyses

Do have proven set of operating & maintenance procedures



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N/A

### Why then IEC-61511?

- Replacement of aging electronic equipment:
  - Gradual migration to "smart" SIL rated devices.
    - Rip and replace of relay systems with safety PLC's.



The pragmatist

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You will have to deal with it sooner or later



### Why then IEC-61511?

- Replacement of aging electronic equipment:
  - Gradual migration to "smart" SIL rated devices
  - Rip and replace of relay systems with safety PLC's
- Best practice safety guideline:
  - Understand the principles
  - Identify what is applicable
  - Have a view and/or plan

The moralist

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#### Always consider opportunities to do it safer



### Why then IEC-61511?

- Replacement of aging electronic equipment:
  - Gradual migration to "smart" SIL rated devices
  - Rip and replace of relay systems with safety PLC's
- Best practice safety guideline:
  - Understand the principles
  - Identify what are applicable
  - Have a view and/or plan
  - Data driven and risk-based approach:
    - Standardisation in works processes
    - Analytical decision making
    - Increased understanding



The analyst

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#### Informed, rational, and consistent decisions.



# Defining a migration strategy?

- Position paper
  - Reasoning
  - Strategy
  - Planning
  - Management "buy-in"
  - Phased execution using the safety lifecycle
- Progression from preventative to a pro-active approach



### Phase 1 Laying the foundation

### Confirm SIS functionality

- SIS asset lists
- Test procedures (at least per asset type)
- Operating procedures (on-line testing)
- Test plans
- KPI's for testing compliance and identifying "issues"
- Managing deviations and change
  - Override procedures
  - Management of change
  - Critical spares management
- Awareness training and tooling

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Who must do, what, when and how

#### You can't manage what you can't measure





### Phase 2 Forging ahead

- Adapting replacement strategies
  Migrate to similar "SIL certified" devices
  Electrical and electronic devices
  - Requires design & validation
- Prior use validation
  - Collect failure rate data
  - Electrical and mechanical devices
  - Understand difference between failure types
- Entrench SIL awareness
  - Broaden general awareness
  - Develop expertise & specifications









Understand the difference

### Phase 3 Reaching the stars

Develop safety requirements specifications

 Cyclic hazard and risk analysis
 Utilising refurbishment projects
 Specific SIL determination studies

 Optimised works processes

 Determine proof test intervals
 Standardised procedures
 Monitoring using leading KPI's

#### Keep going ... it is the right thing to do



## In summary, the SIS journey

- **Preventative** meeting minimum requirements for safe operation.
- **Calculative** in tracking 2 failure rates ... where it makes sense.



Understanding the "why", 3 with refined more predictive measures.

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