Metodologia Aplicada à Implementação de Projetos de Sistemas de Segurança

Abril, 2012

Presenter: Paulo Valentini

Honeywell

Proteção de Processo e Segurança (Process Safety and Security)

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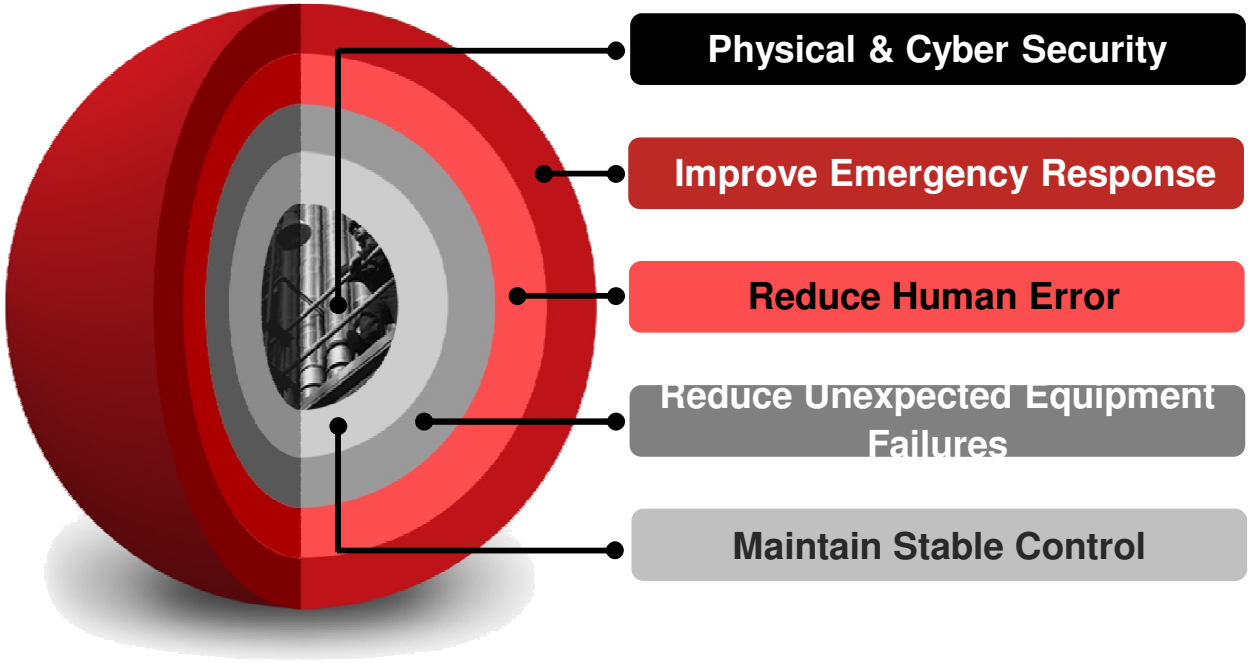
Process Safety & Security

Preserve Operations

Avoid billions lost per year due to unplanned production losses

Layered Approach to Plant Safety & Security



Process Safety Investment Can Also Drive Business Performance

Confiabilidade do Sistema (System Reliability)

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Reliability

Robustness maximize process availability

- **SIL 1,2 and 3 Safety Instrumented system**
- **Supports full redundancy**
  - **Processor**
  - **IO**
  - **Communication**
- **Support for Integrated and Segregated topologies**

Maximize uptime

Eficiencia Operacional (Operational Efficiency)

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Efficiency

Remote management and data exchange

- **TUV approved On Line Modification technique**
  - Hardware additions and changes
  - Application additions and changes
  - Firmware updates
- **Remote management**
  - Configurable per Safety Manager
- **Easy data exchange with process controllers**
  - Peer Control Data Interface

Maximize uptime

Camadas de Proteção (Layer Protection)

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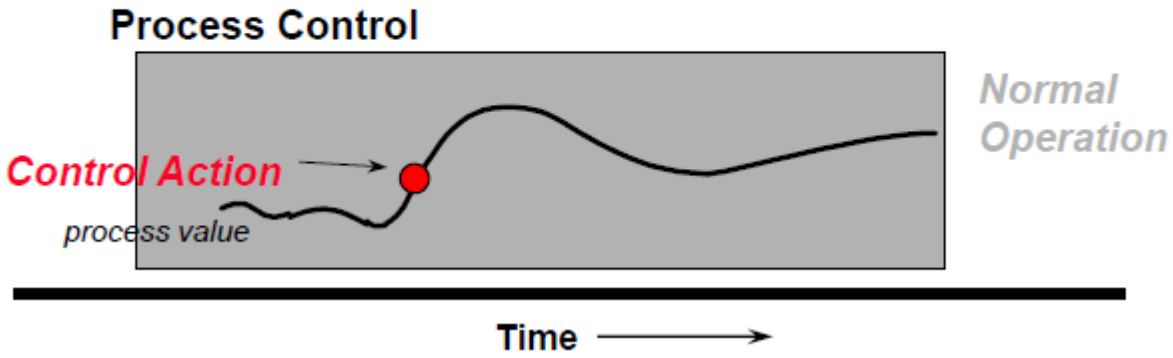
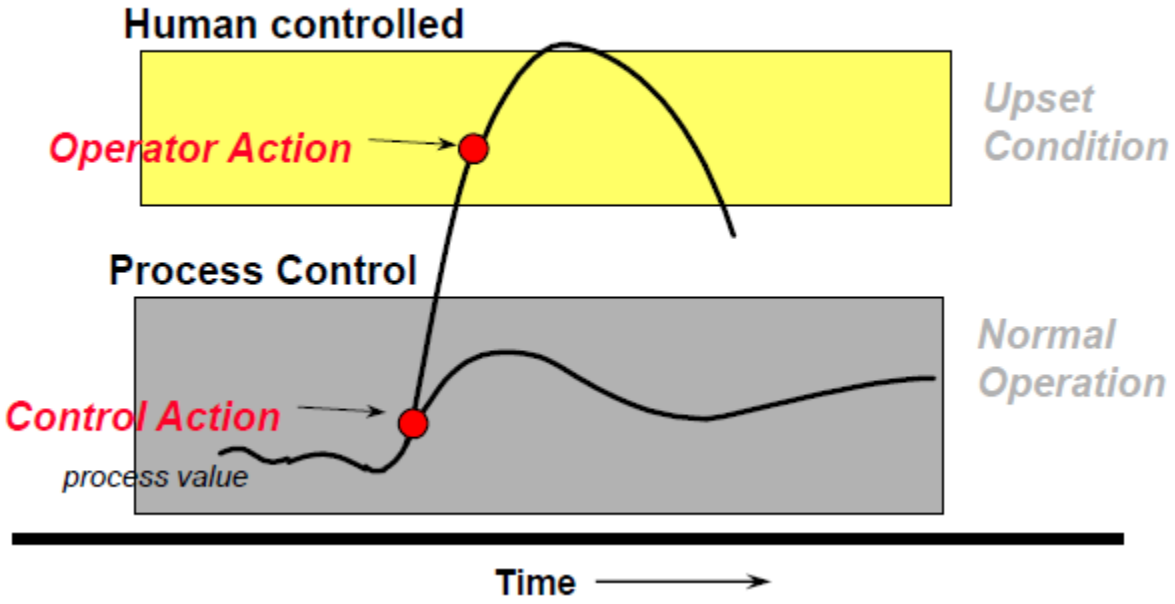


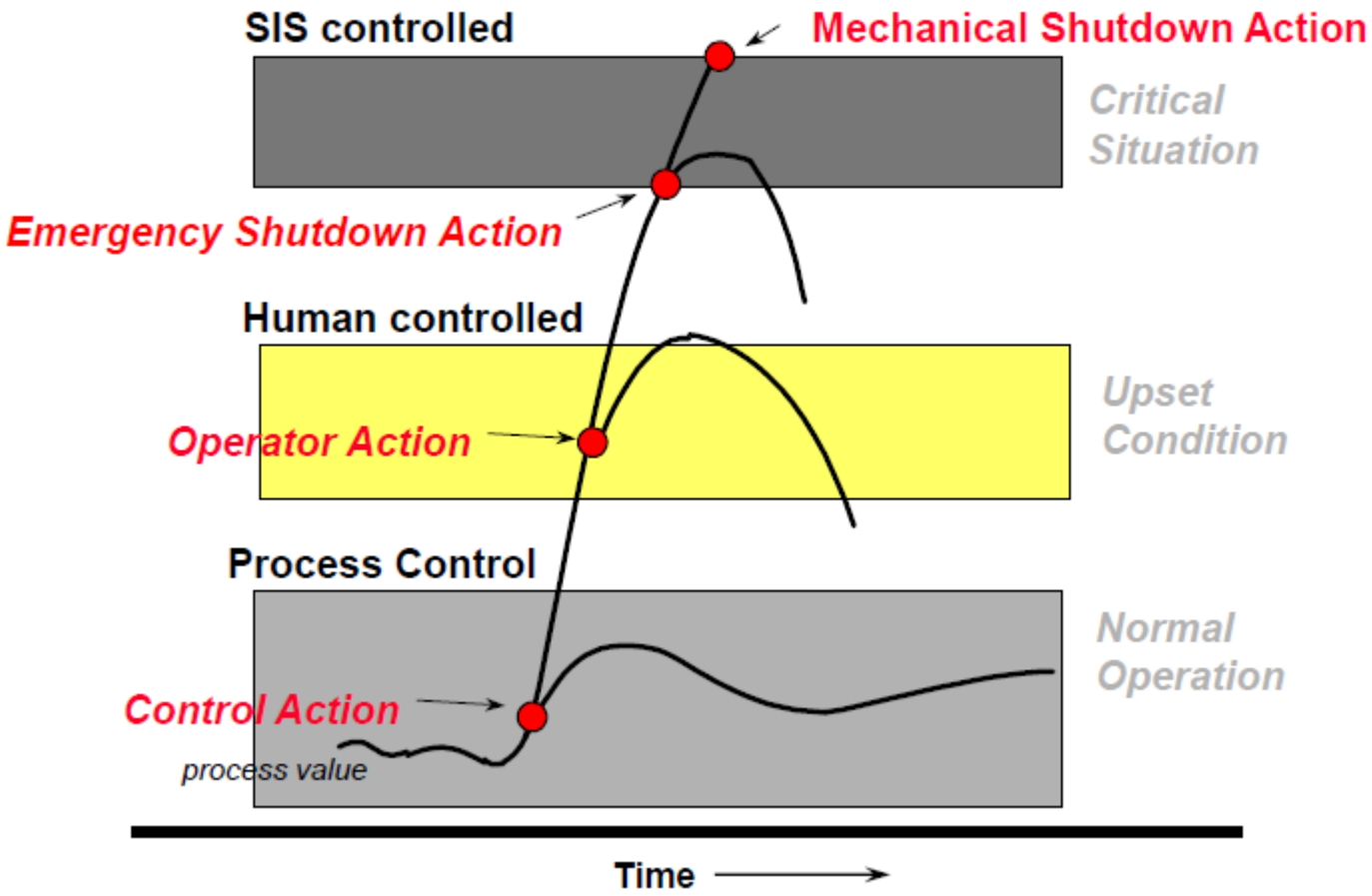
Camadas de Proteção (Layer Protection)

Honeywell



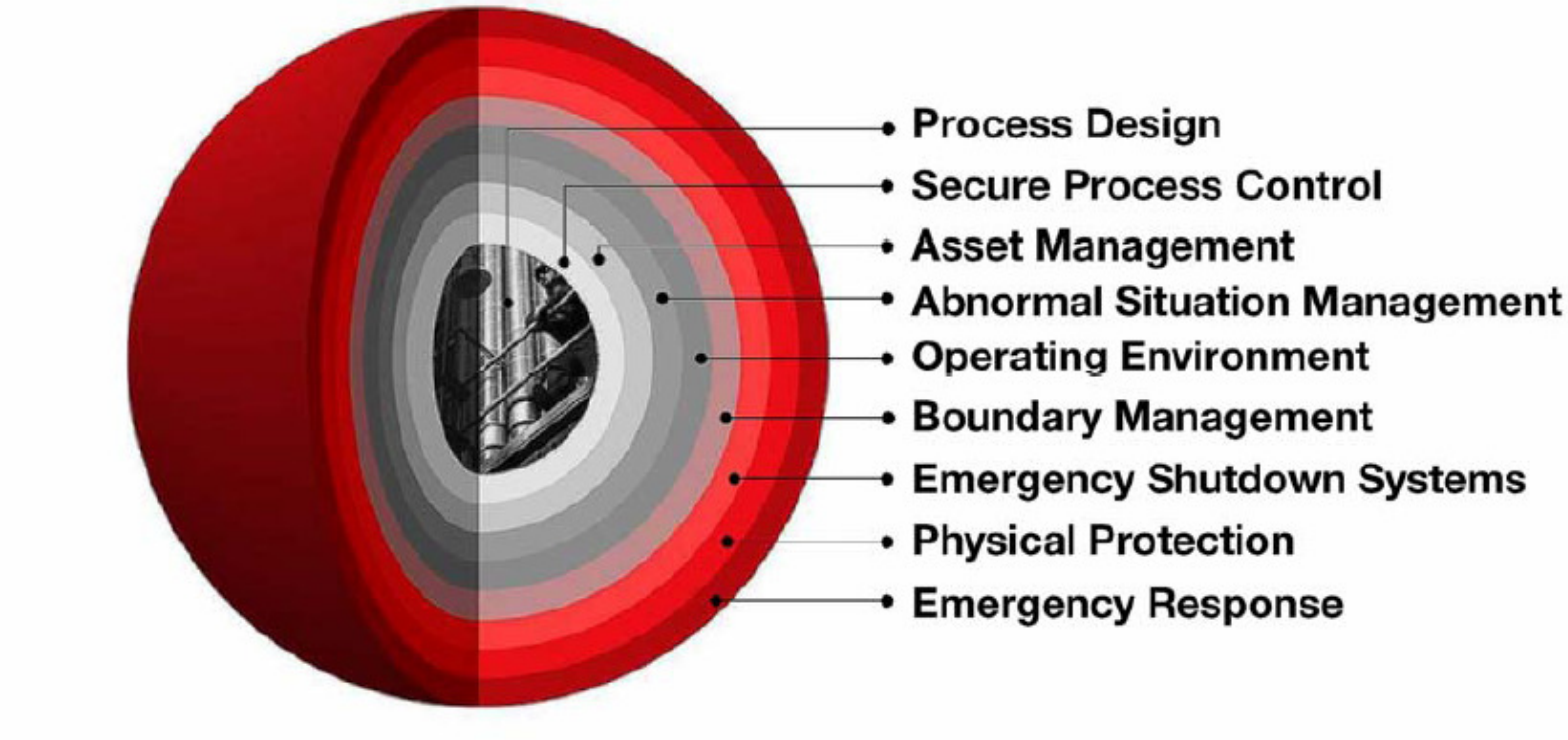
Camadas de Proteção (Layer Protection)

Honeywell



Camadas de Proteção (Layer Protection)

Honeywell



Camadas de Proteção (Layer Protection)

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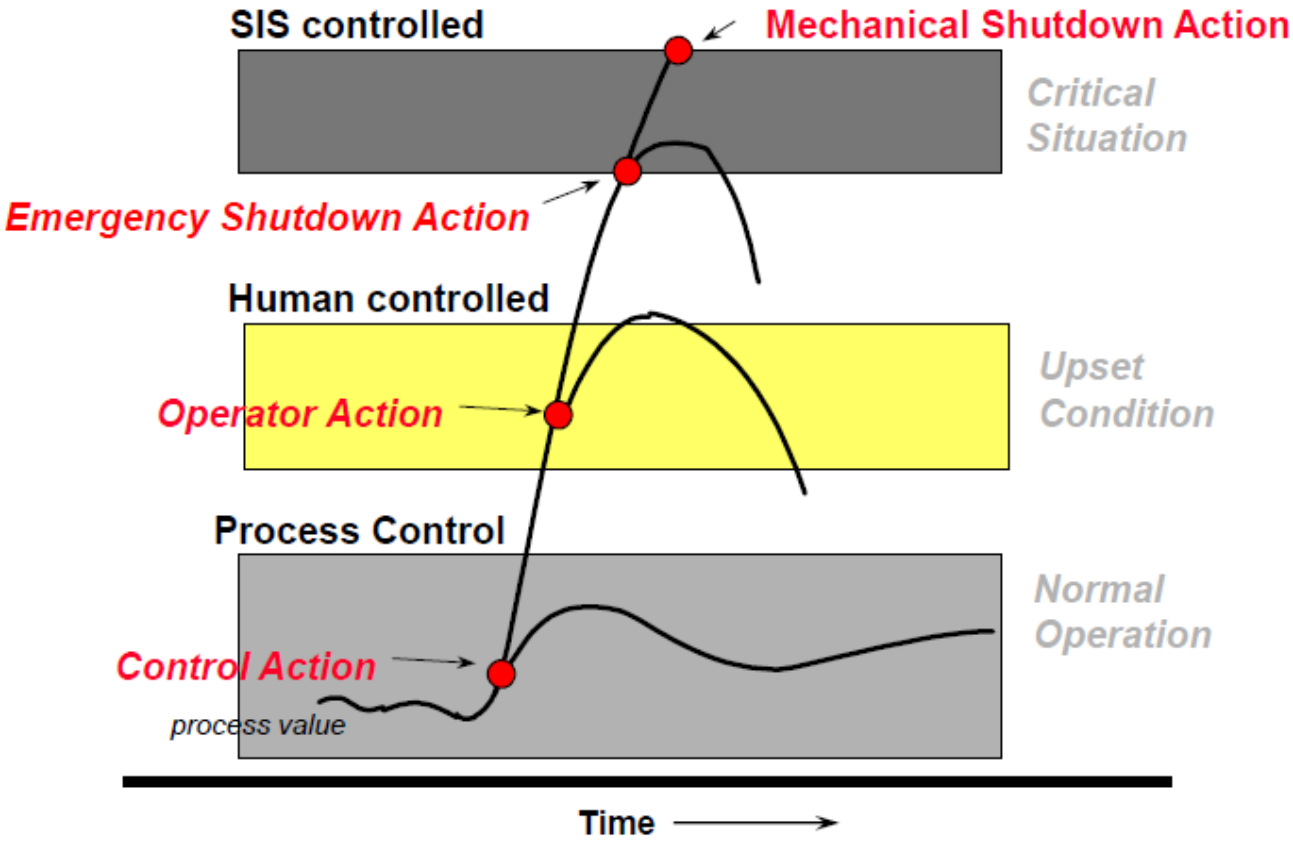

There are required actions taken at each step to mitigate this escalation.

Camadas de Proteção (Layer Protection)

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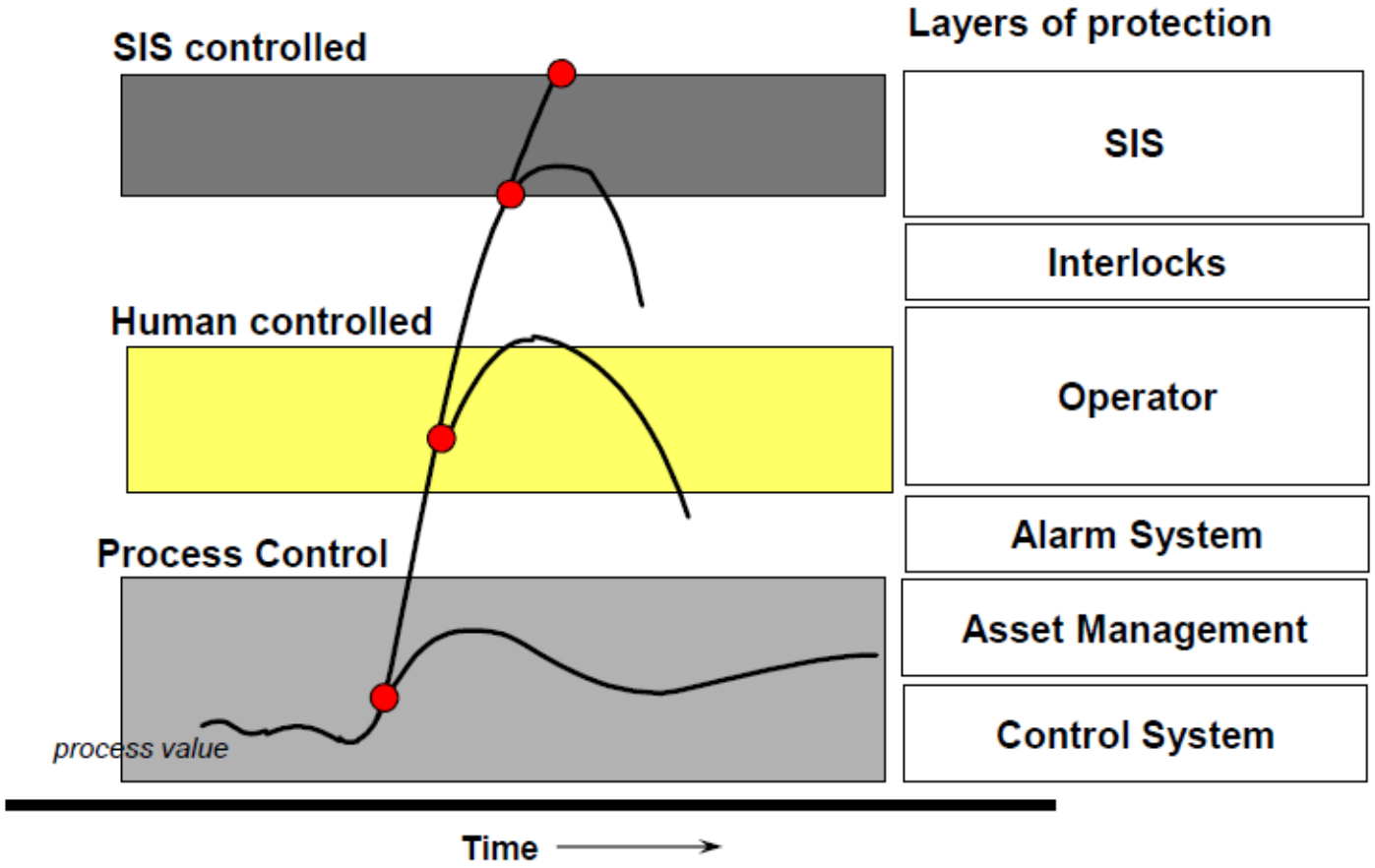

To aid in these actions various layers of protection are employed.

Camadas de Proteção (Layer Protection)

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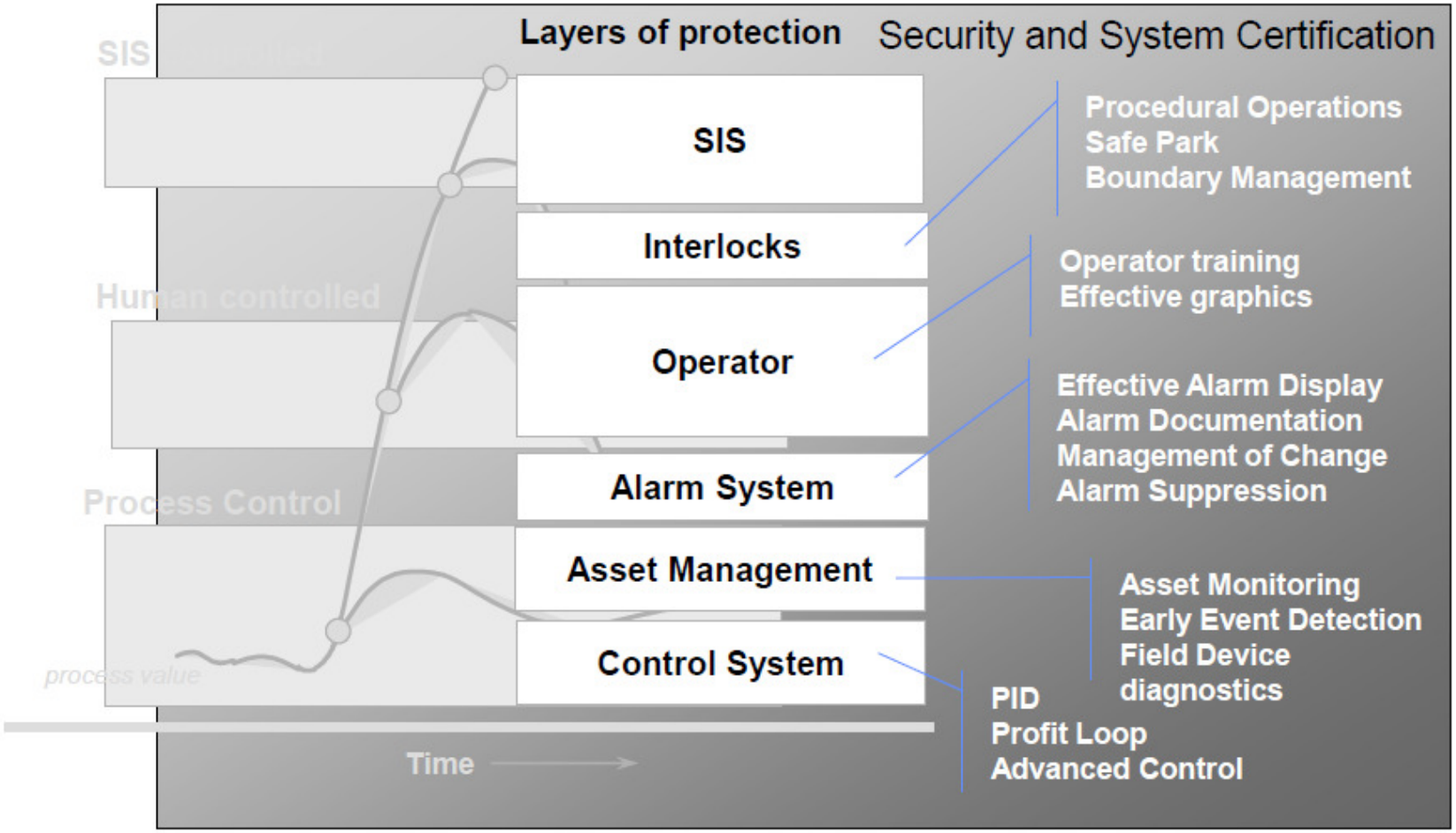

Each of the layers of protection have their own set of requirements

Camadas de Proteção (Layer Protection)

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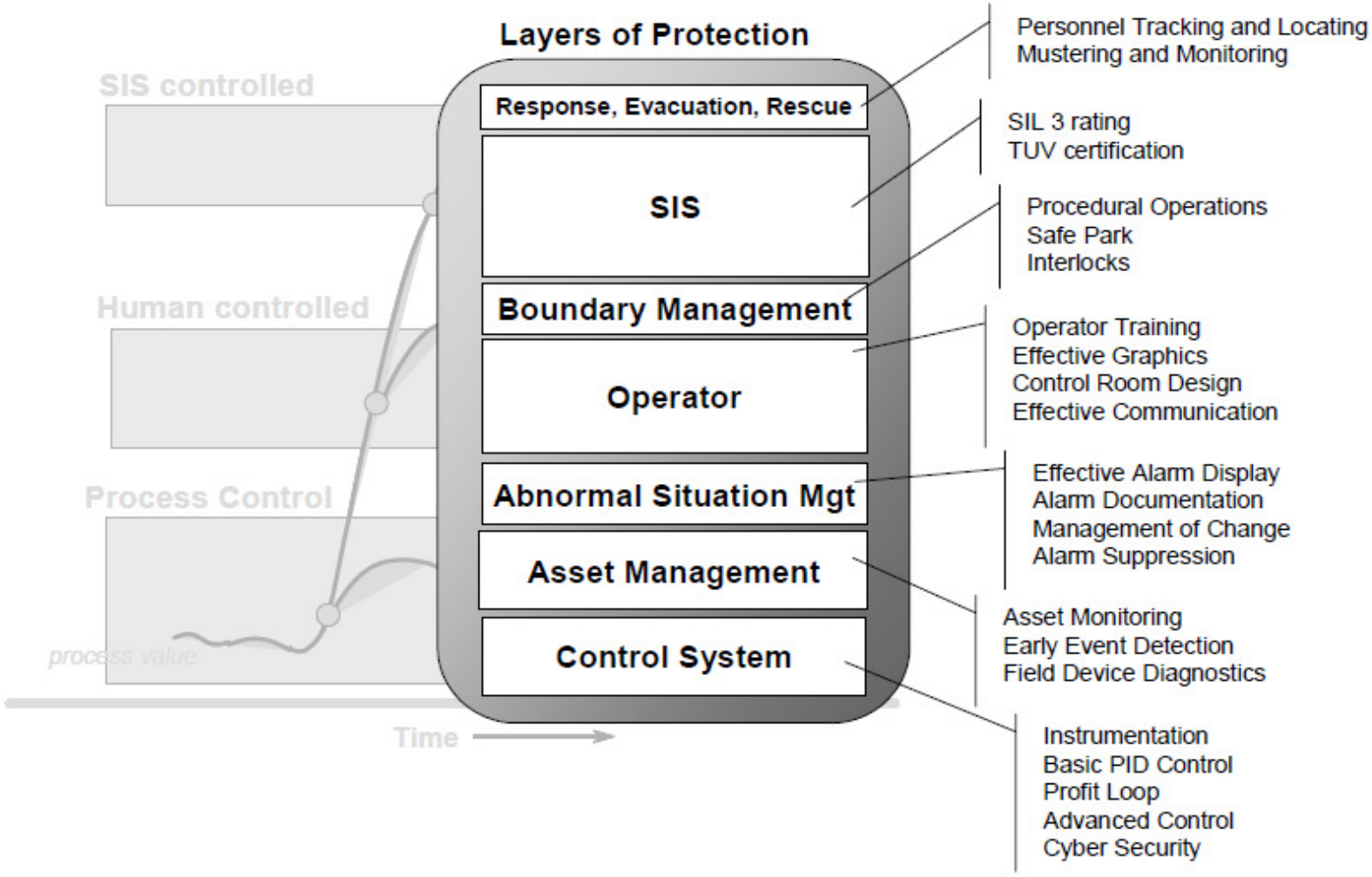

Figure 6. Components of the Layers of Protection

Ciclo de Vida (Safety Lifecycle)

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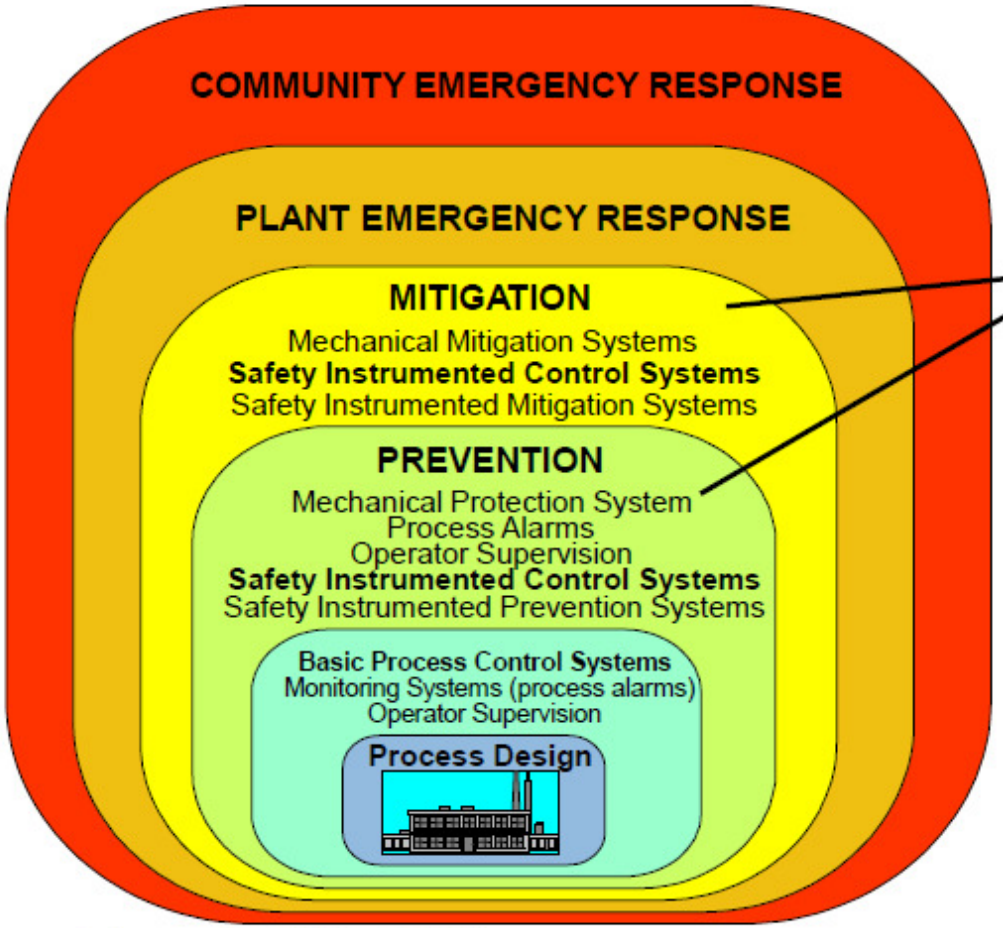
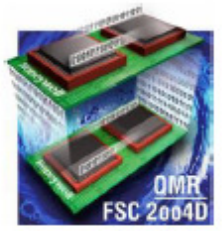


Figure 9 of IEC 61511

Safety Layer(s)

Mitigation:
e.g. Fire and Gas Safety system

Prevention:
e.g. ESD Safety system



IEC 61511 Ciclo de Vida de Serviços (Safety Lifecycle Services)

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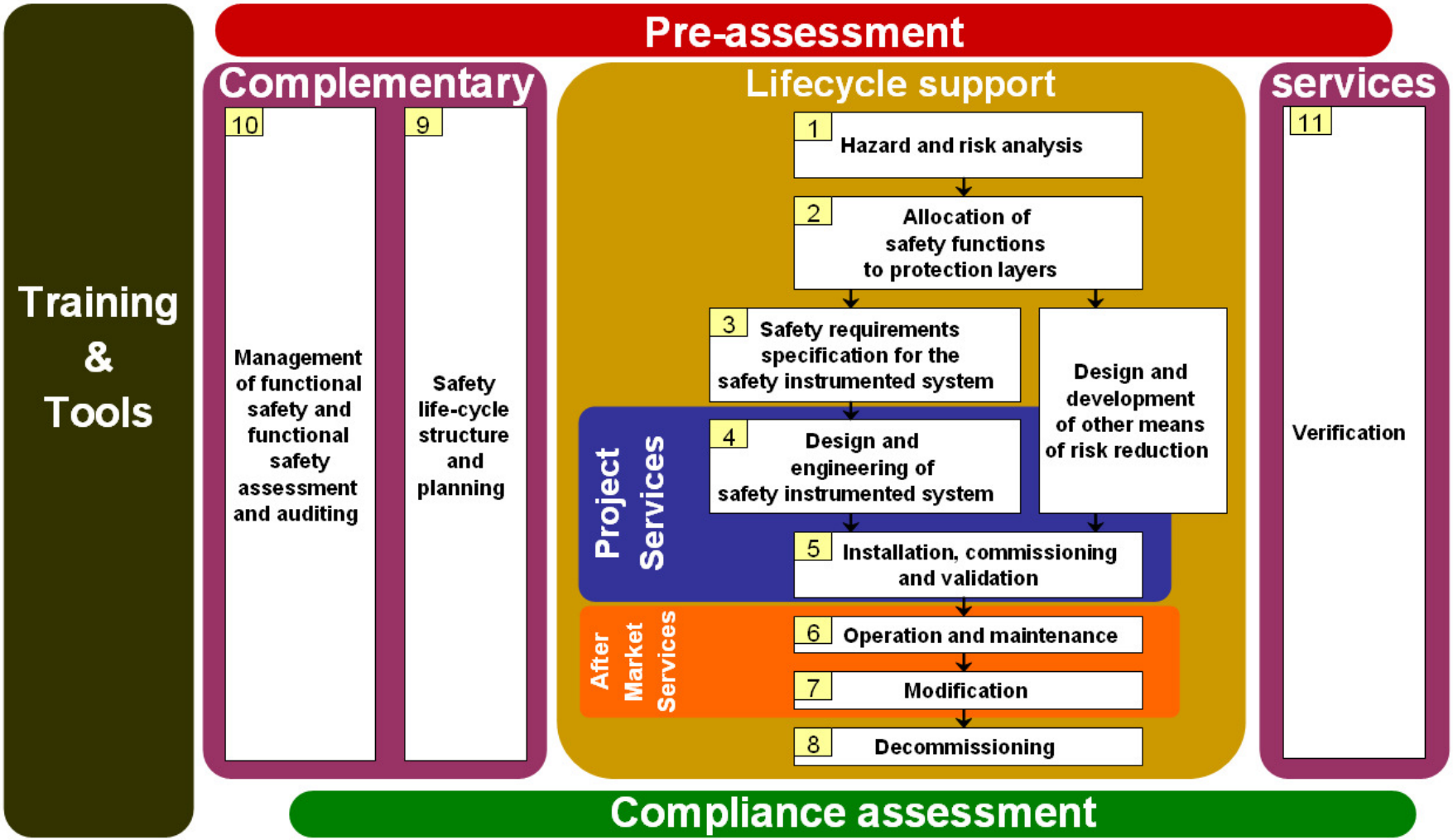

Regulations and Standards

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United States Environmental Protection Agency

ISA - The Instrumentation, Systems, and Automation Society

- During Late 1980's, industry safety performance deemed inadequate by regulators
- OSHA Process Safety Management Standard (PSM) 29 CFR 1910.119 (1992)
- EPA Accidental Release Prevention Program 40 CFR 68 (1996) – "Risk Management Program"
- ISA and IEC develop standards to clarify requirements

Safety Engineering Applications

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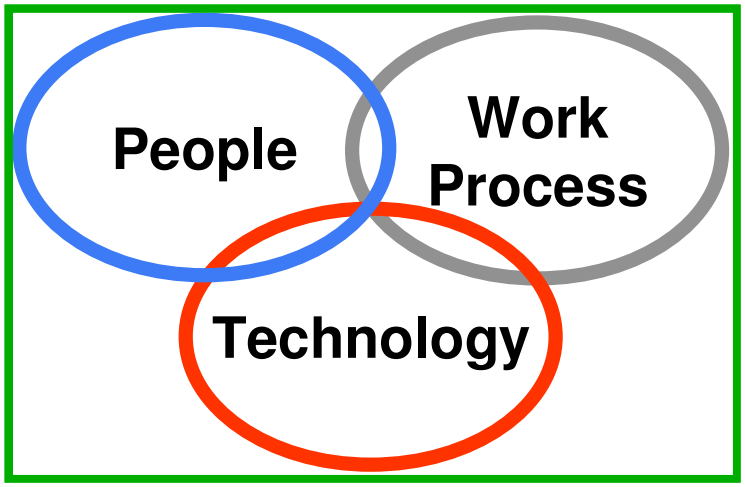
ISA 84.01 requires management of functional safety throughout the whole design lifecycle. Honeywell performs this globally through certification programs for People, Product and Processes

- People
- Product/Technology
- Processes



These programs are certified through an internationally recognized certification body TÜV.

TÜV

IEC 61511 Safety Lifecycle Services

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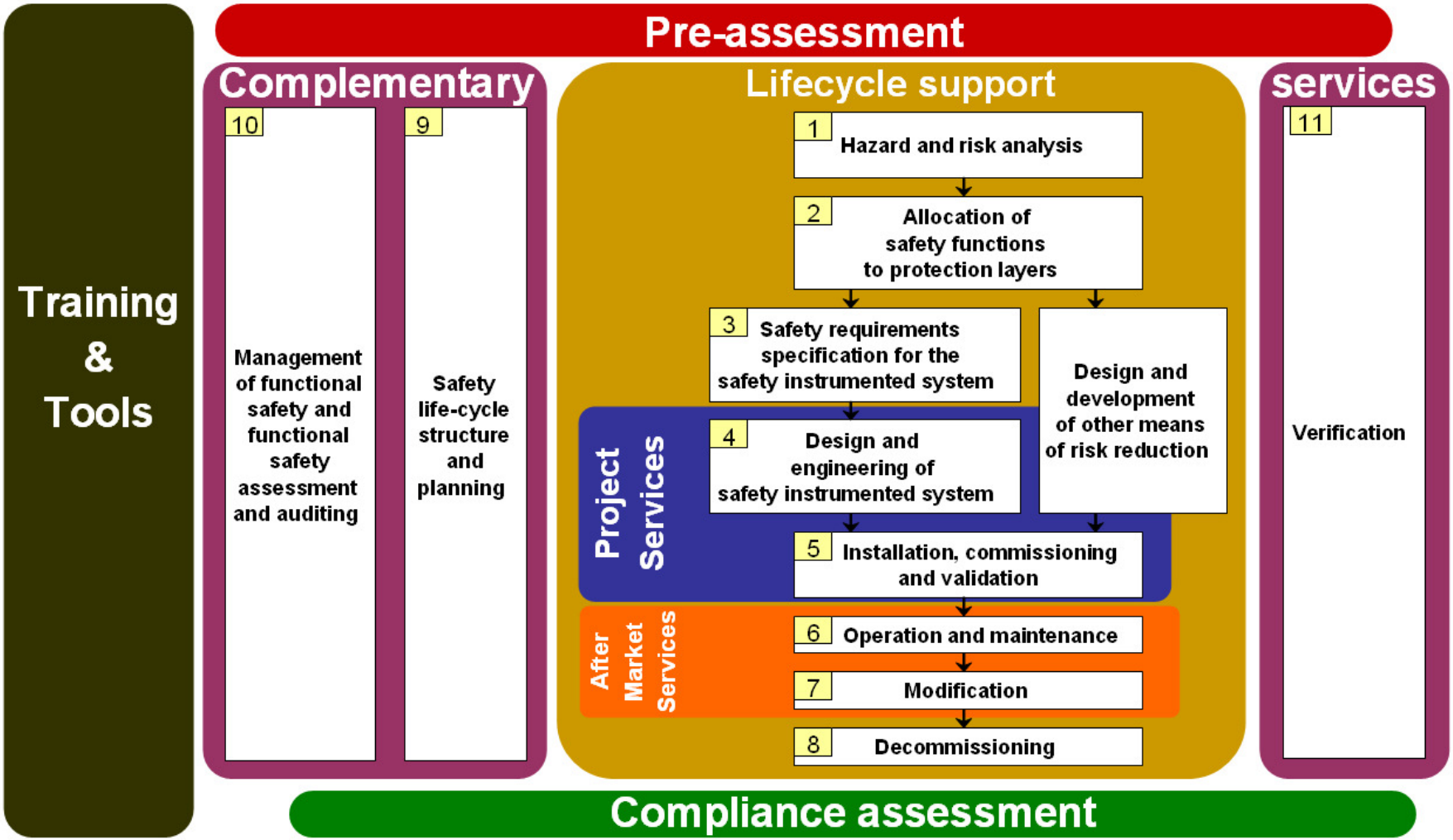

Process Hazards Analysis

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- Purpose is to identify hazards requiring safeguards
- Usually series of studies
  - Design practices and Standards
  - Formal Studies
- A HAZOP is a useful tool to identify hazards
- It does not set performance standards for safety functions!
- Proper tools:
  - LOPA (Layer of Protection Analysis)
  - Risk Graph
  - Quantitative
  - Others…

SIL Selection

Honeywell

- Purpose is to define a performance criterion
- Analyze risk without SIS and assign enough "integrity" to SIS to achieve tolerable risk

A measure of the amount of risk reduction provided by a Safety Instrumented Function (SIF)

Safety Integrity Level	Safety	Probability of Failure on Demand	Risk Reduction Factor
SIL 4	> 99.99%	0.001% to 0.01%	100,000 to 10,000
SIL 3	99.9% to 99.99%	0.01% to 0.1%	10,000 to 1,000
SIL 2	99% to 99.9%	0.1% to 1%	1,000 to 100
SIL 1	90% to 99%	1% to 10%	100 to 10

O Fabricante define o SIL (The Vendor/Licensor defines my SIL)

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- The Vendor/Licensor knows the equipment or process
- They do NOT know your:
  - Safety tolerances
  - Physical Surroundings
  - Operating Practices
- Only the User should define the SIL

IEC 61511 Safety Lifecycle Services

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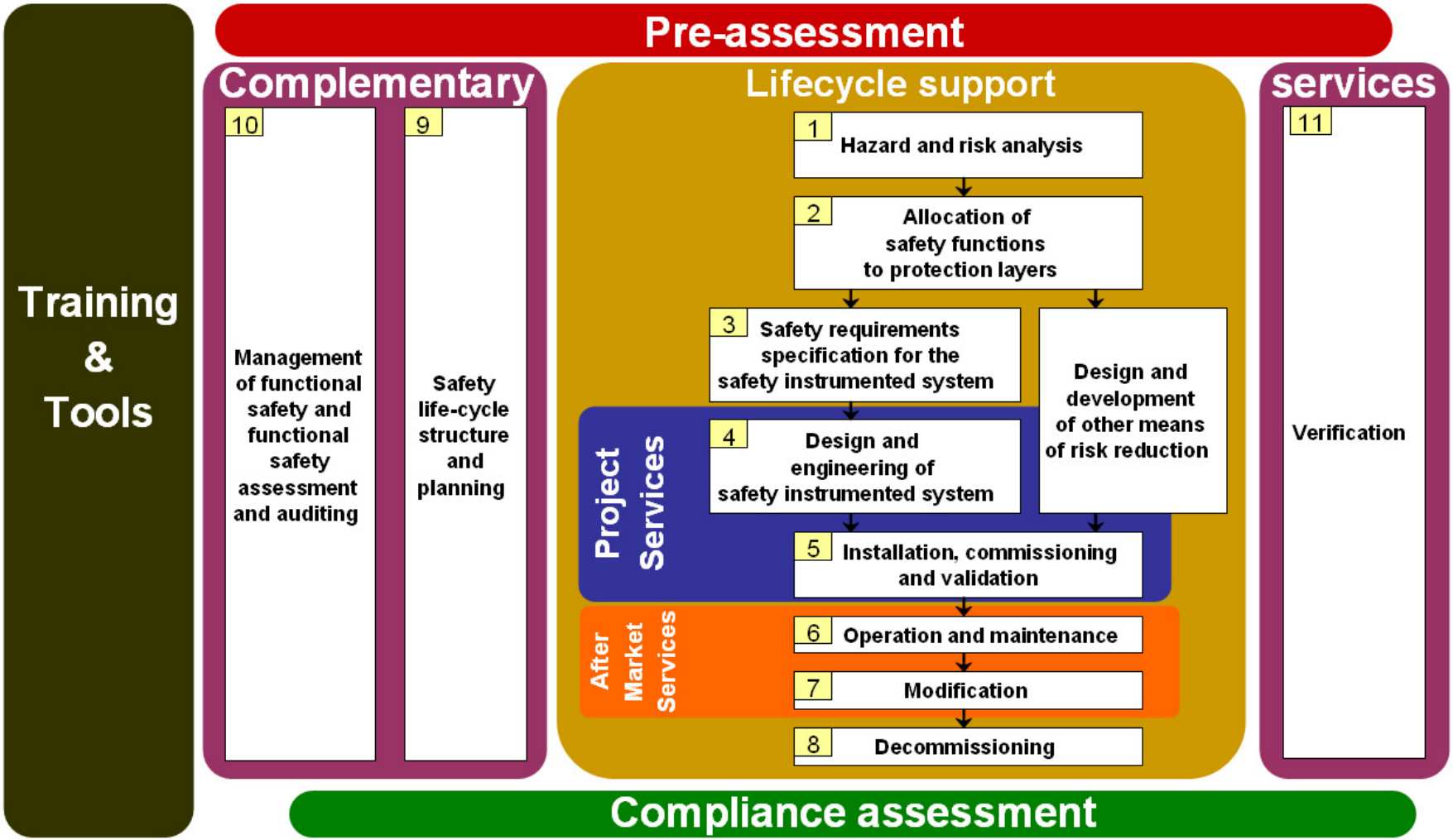

Safety Requirements Specifications

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- Defines SIS behavior
  - Functional specifications
  - Integrity specifications
- Numerous documents, mainly logic solver functional specification
  - Logic Description (Cause-and-Effect or Logic Diagram)
  - General Notes

Planos de Teste para cada SIF

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- One for each SIF
- Describes each step taken
- Matches PFD calculations
- Takes into account startup resources
  - Personnel
  - Equipment
  - Time

Verificação SIL

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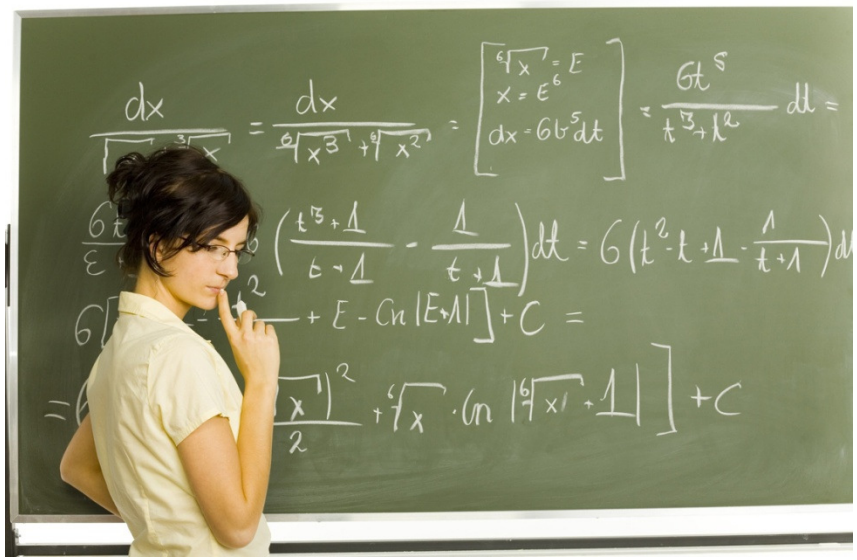

- **Purpose is to verify each SIF has sufficient integrity to meet the selected SIL**
- **Quantify performance (SIL achieved or PFD)**

Safety Engineering Applications

Honeywell

We provide safety solutions to protect:

- People

- Process plant

- Environment

Safety Engineering Applications

Honeywell

How are Honeywell Project Operations set up to execute this?

Safety Engineering Applications

Honeywell

A requirement for Safety Engineering COE was recognized within HPS (Honeywell Process Solutions)

Primarily because:

- Roll out of international standards
- Global customer expectations of compliance to such standards
- Standardize the method of project execution for safety solutions under initiatives like ‘copy exact’ and ‘standard build’.

Safety Engineering Applications

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Safety COE responsibilities include:

- Execute projects
- Provide consultancy services
- Training – Product and Processes
- Site services
- TAC, provide support througout the regional offices

Safety Engineering Applications

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How does Honeywell deliver a fully compliant solution?

Safety Engineering Applications

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The Safety COE has experience of implementing projects on the following TÜV approved platforms

Safety Manager (SM)

Fail Safe Controller (FSC)

TÜV Rheinland/
Berlin-Brandenburg

TÜV

TÜV Anlagentechnik GmbH
Automation, Software und Informationstechnologie

ZERTIFIKAT
CERTIFICATE

Nr./No. 968/EL 205.00/03

Prüfgegenstand Product tested	Fault Tolerant Safety and Critical Control System 1oo2D, 2oo3D	Hersteller Manufacturer	Honeywell Safety Management Systems Rietveldenweg 32 NL-5222 AR 's-Hertogenbosch The Netherlands
Typbezeichnung Type designation	Fail Safe Controller FSC	Verwendungszweck Intended application	Safety Related Programmable Electronic System for process control, emergency shut down, burner management, fire and gas
Prüfgrundlagen Codes and standards forming the basis of testing	NFPA 85 - 2001 NFPA 86 - 1999 NFPA 72 - 1996		

Product

Safety Engineering Applications

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Honeywell recognizes safety as a key engineering discipline. The Safety COE drives competency through engineering excellence initiatives for example training and certifying our engineers through the TÜV FS Engineer and CFSE programs.

People

Safety Engineering Applications

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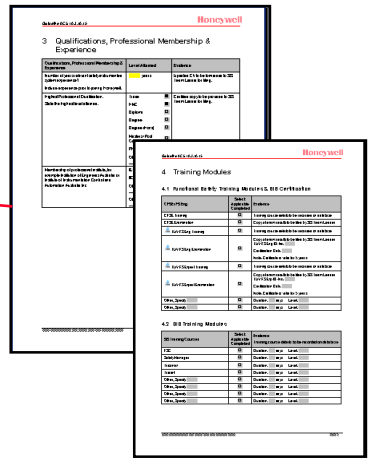
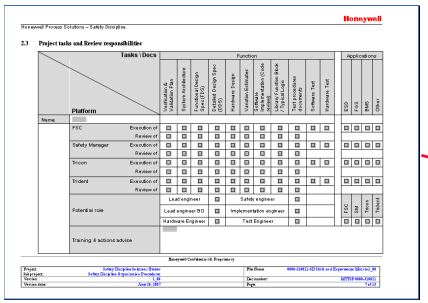
1) Skills assessment Questionnaire

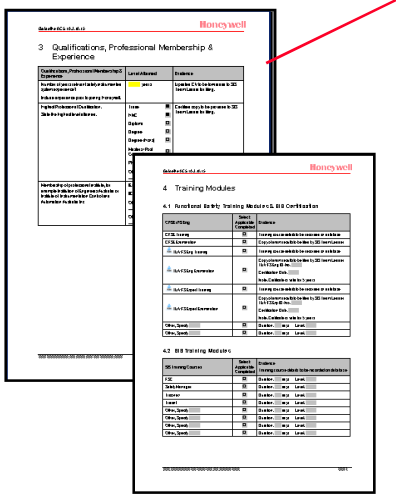
- Short, high-level questionnaire
- Easy and fast to complete, low threshold





2) Skills Matrix

- Complete Skill matrix per person
- Issue more detailed questionnaire for persons that can fulfil critical roles
- Define Potential roles
- Main requirement TÜV certification



People

Safety Engineering Applications

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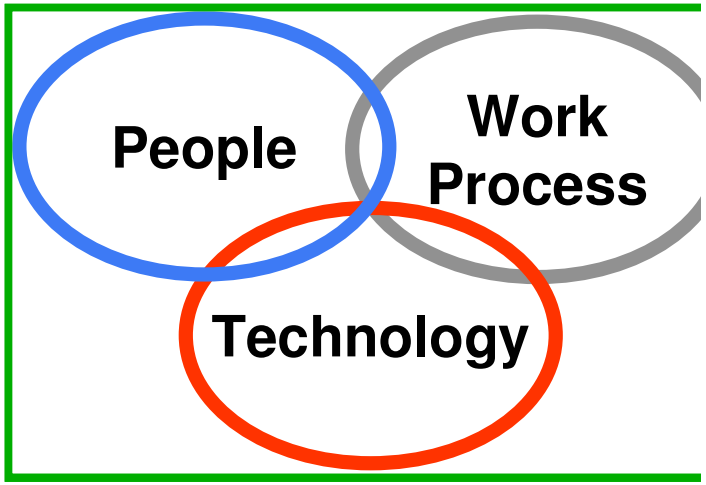
The processes followed compliment the people and technology. This process is used for the execution of all SIS projects and is certified to SIL 3 by TUV.

- Uses Global Design Templates
- Makes use of standard functions
- Aligned with HMI Solution Pack
- Competence of SIS resources managed




ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

TÜV MANAGEMENT SERVICE

No. Q4 99 10 20160 005

TÜV PRODUCT SERVICE GMBH certifies that

Honeywell
Safety Management Systems B.V.
Brandenjstraat 6
5223 AS 's Hertogenbosch
The Netherlands

in the facility:

Processes

• Execution of customer projects

has established and is maintaining a functional safety management system, integrated into their quality system, which meets the requirements of:

IEC 61508:1999, parts 1-7

as documented in report no. HH 57699

Munich, 06-10-1999

CERTIFICATION BODY OF
TÜV PRODUCT SERVICE GMBH

Department: ASE-IQSE / Faller

Safety Engineering Applications

Honeywell

Project Services executed by the COE

- FEED Studies
- Basis of Design Review
- Outline the SIS Project Execution Plan
- Carry out SIS Verification and Validation activities
- Define Hardware requirements and execute build
- Define Software requirements and execute application scope
- Define and execute acceptance test requirements

Safety Engineering Applications

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Consultancy Services executed by the COE

- LOPA/Risk Graph execution
- SIL analysis
- Safety Requirement Specification (SRS) generation
- SRS review
- Reliability and Availability calculations
- Cause & Effect review/creation

Safety Engineering Applications

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Training Services executed by the COE

- Course (4550) SM Maintenance Course
- Course (4551) SM Implementation
- Course (4552) Operator
- Course (4553) Overview
- Course (4503) TUV Functional Safety Engineer

Course 4503 is a formal training course that covers the application of IEC61511 and ISA 84.01 for Process Safety. It is executed by Honeywell and is aimed at Honeywell and Customer engineers working on Safety Instrumented Systems. There is a formal qualification provided (TUV FS Eng) on successful completion of the course.

TUV Approved Design Process

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Honeywell executes hardware and software design following a process certified by TUV. This satisfies the requirements of ISA 84.01, IEC61511 & IEC61508 for the management of functional safety.

Review Basis of Design / KOM Checklist

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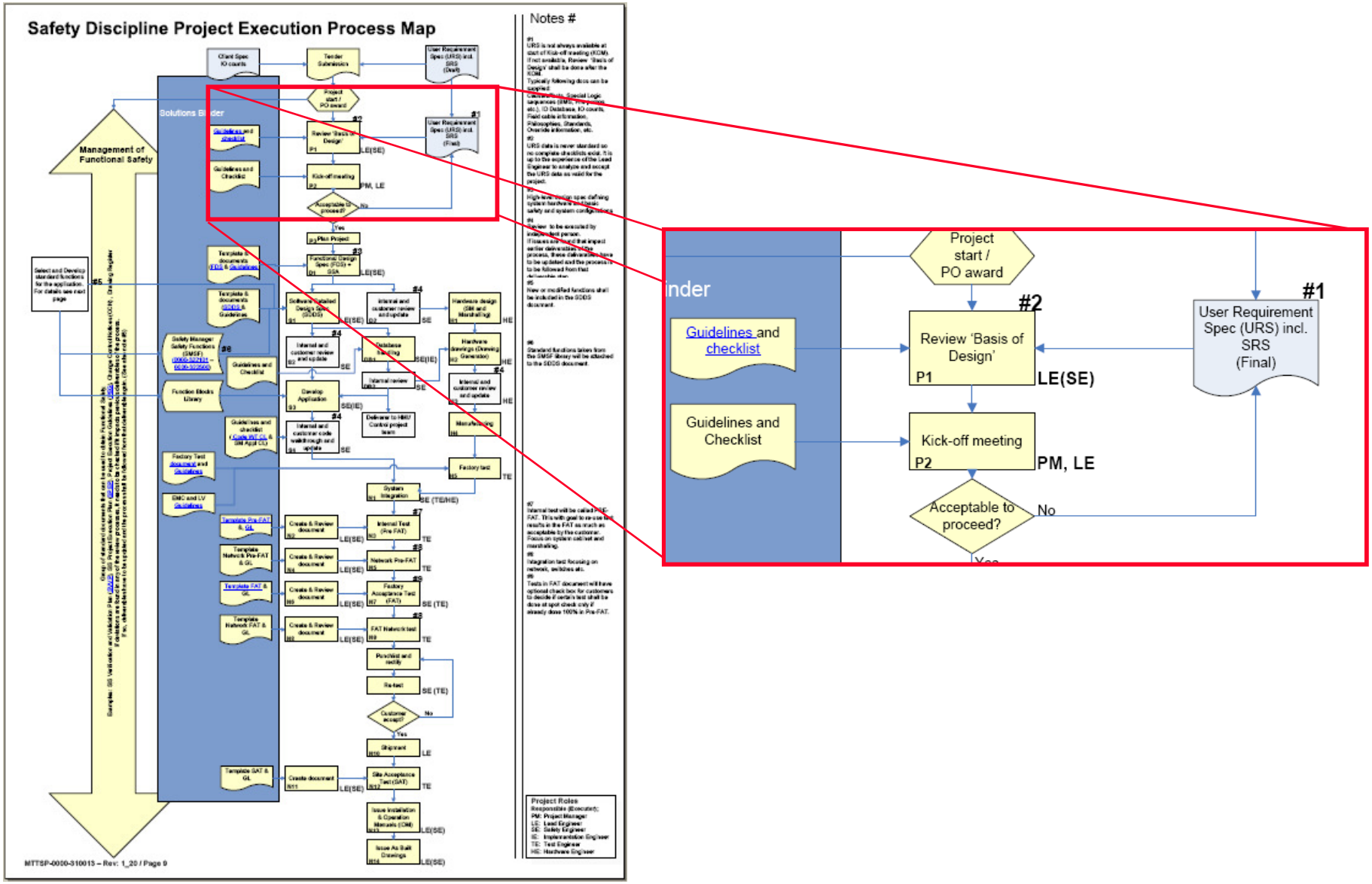
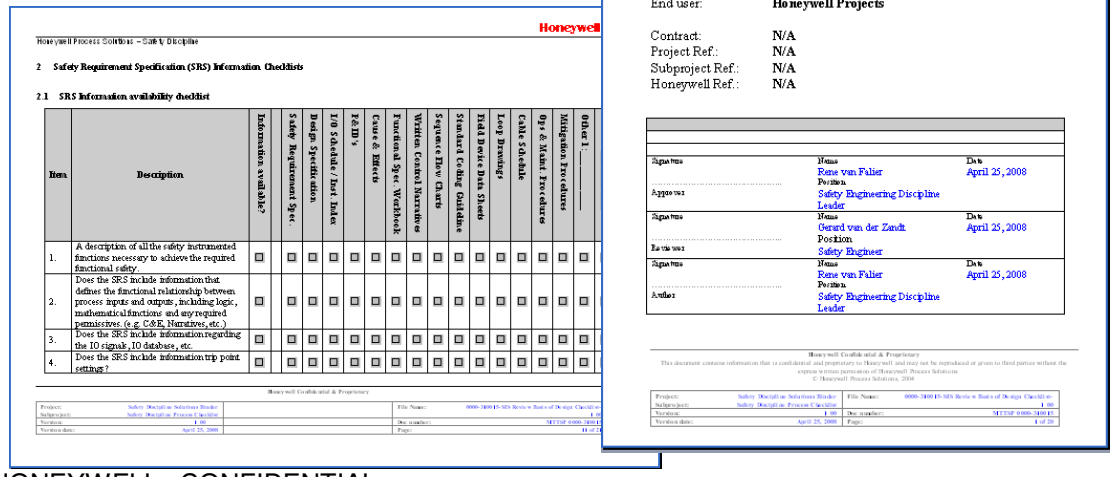


Review Basis of Design Checklist

Honeywell

- The Safety Requirement Specification is the key input document for the safety project execution.
- This data shall be checked on completeness and clarity before the project execution is started.
- The Review Basis of Design checklist is available to help the safety engineer to check the provided SRS data on this.
- The analysis of the SRS is a key TÜV requirement. This checklist can be used to prove the compliance with this requirement.



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Honeywell Process Solutions – Safety Discipline

2 Safety Requirement Specification (SRS) Information Checklists

2.1 SRS Information availability checklist

Item	Description	Information available?	Safety Requirement Spec.	Design Specification	I/O Schedule / Inst Index	P&ID's	Cause & Effects	Functional Spec. Workbook	Written Control Narratives	Sequence Flow Charts	Standard Coding Guideline	Field Device Data Sheets	Loop Drawings	Cable Schedule	Op's & Maint Procedures	Mitigation Procedures	Other 1 _____
1.	A description of all the safety instrumented functions necessary to achieve the required functional safety	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2.	Does the SRS include information that defines the functional relationship between process inputs and outputs, including logic, mathematical functions and any required permissives (e.g. C&E Narratives, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3.	Does the SRS include information regarding the IO signals, IO database, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.	Does the SRS include information trip point settings ?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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Honeywell Process Solutions – Safety Discipline

SIS REVIEW BASIS OF DESIGN CHECKLIST

Doc. No.: MTTSP 0000-310015
Version: 1_00
Status: Approved
Date: April 25, 2008

Project: Safety Discipline Solutions Binder
Subproject: Safety Discipline Process Checklist
Reference: Safety Discipline
Customer: Honeywell Global Project Organization
End user: Honeywell Projects

Contract: N/A
Project Ref.: N/A
Subproject Ref.: N/A
Honeywell Ref.: N/A

Signature	Name: Rene van Faller Position: Safety Engineering Discipline Leader	Date: April 25, 2008
Approved		
Signature	Name: Gerard van der Zandt Position: Safety Engineer	Date: April 25, 2008
Reviewed		
Signature	Name: Rene van Faller Position: Safety Engineering Discipline Leader	Date: April 25, 2008
Author		

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Project Execution / Verification & Validation Plan

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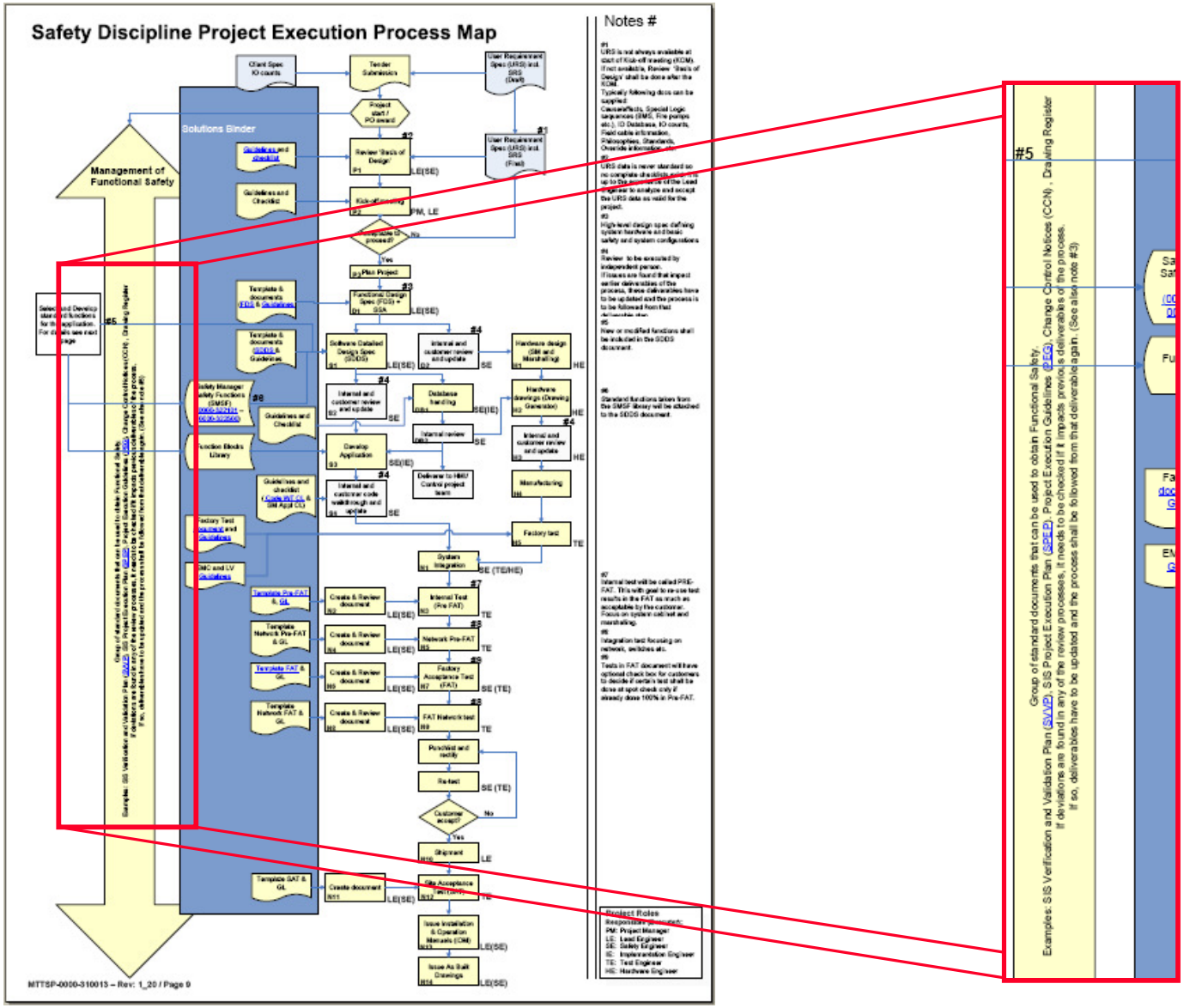
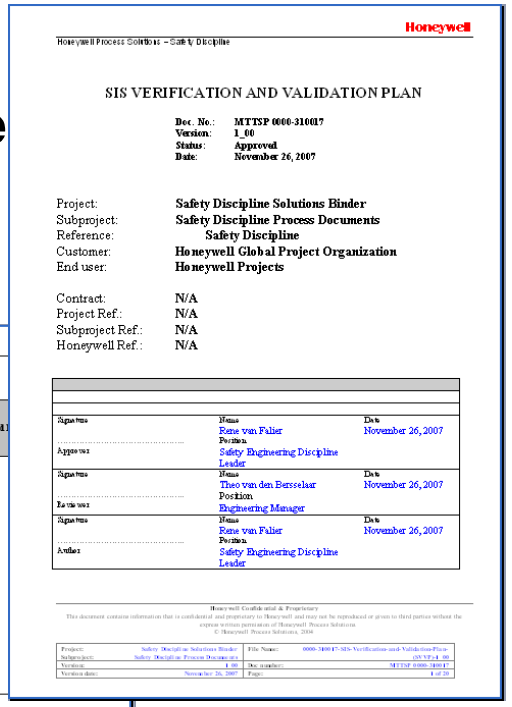


SIS Verification & Validation Plan (SVVP)

Honeywell

- In the SVVP document all verification and validation steps for the project are defined.
- The SVVP is used to select and sign off on every V&V step of the project execution that is applicable for the project.
- It defines the verification requirements, verification personnel and the verification activities.
- It defines for each selected verification step, the documents with which the verification items will be compared.
- The SVVP is a key TÜV certification document.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Honeywell Process Solutions – Safety Discipline

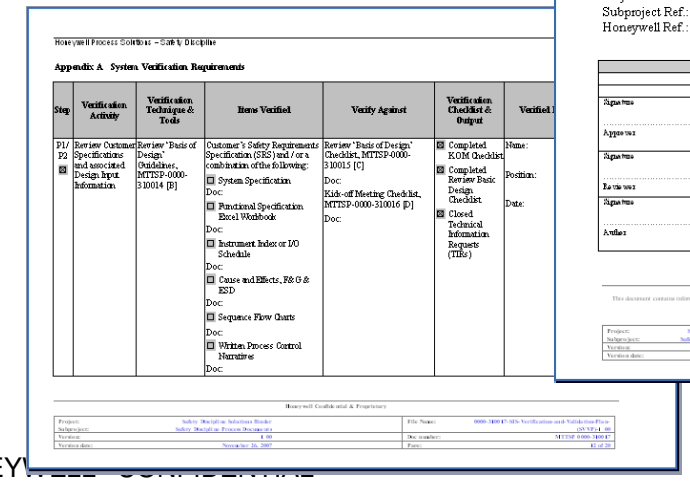
SIS VERIFICATION AND VALIDATION PLAN

Doc. No.: MTTSP 0000-310017
Version: 1_00
Status: Approved
Date: November 26, 2007

Project: Safety Discipline Solutions Binder
Subproject: Safety Discipline Process Documents
Reference: Safety Discipline
Customer: Honeywell Global Project Organization
End user: Honeywell Projects

Contract: N/A
Project Ref.: N/A
Subproject Ref.: N/A
Honeywell Ref.: N/A

Signature	Name: Rene van Falier Position: Safety Engineering Discipline Leader	Date: November 26, 2007
Approved		
Signature	Name: Theo van den Berselaar Position: Engineering Manager	Date: November 26, 2007
Reviewed		
Signature	Name: Rene van Falier Position: Safety Engineering Discipline Leader	Date: November 26, 2007
Author		


Honeywell Process Solutions – Safety Discipline

Appendix A System Verification Requirements

Step	Verification Activity	Verification Technique & Tools	Items Verified	Verify Against	Verification Checklist & Output	Verified
P1/ P2	Review Customer Specifications and associated Design Input Information	Review 'Basis of Design' Guidelines, MTTSP-0000-310014 [B]	Customer's Safety Requirements Specification (SRS) and / or a combination of the following: System Specification Doc: Functional Specification, Excel Workbook Doc: Instrument Index or I/O Schedule Doc: Cause and Effects, F&G & ESD Doc: Sequence Flow Charts Doc: Written Process Control Narratives Doc:	Review 'Basis of Design' Checklist, MTTSP-0000-310015 [C] Doc: Kick-off Meeting Checklist, MTTSP-0000-310016 [D] Doc:	Completed KOM Checklist Completed Review Basic Design Checklist Closed Technical Information Requests (TIRs)	Name: Position: Date:

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Project:	Safety Discipline Solutions Binder	File Name:	0000-310017-SIS-Verification-and-Validation-Plan-(SVVP)-1_00
Subproject:	Safety Discipline Process Documents		
Version:	1_00	Doc number:	MTTSP 0000-310017
Version date:	November 26, 2007	Page:	41 of 59

SIS Project Execution Plan (SPEP)

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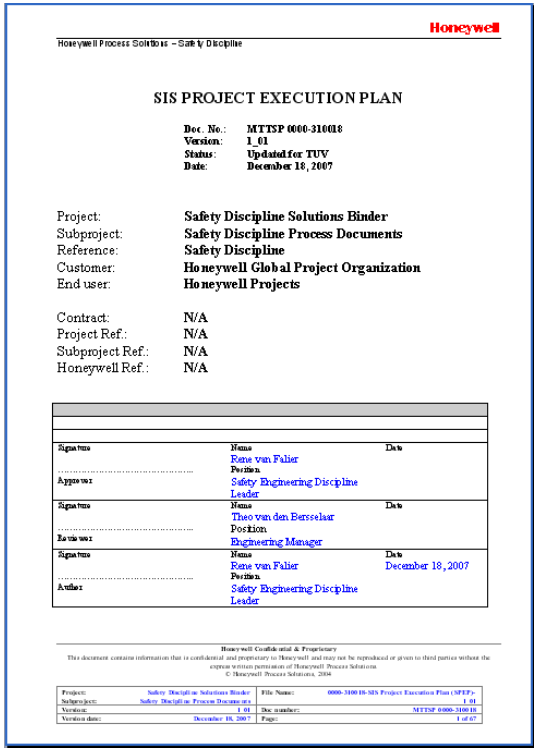
- The SIS Project Execution Plan describes in detail the entire execution plan for executing the safety system project.
- The SPEP includes the Functional Safety Management Plan requirements as defined by TÜV.
- Significant part of TÜV standard audit checks are covered by this document
- The SPEP is a standard template that requires minimum effort to update with the project specific information.



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Honeywell Process Solutions – Safety Discipline

SIS PROJECT EXECUTION PLAN

Doc. No.: MTTSP 0000-310018
Version: 1_01
Status: Updated for TUV
Date: December 18, 2007

Project: Safety Discipline Solutions Binder
Subproject: Safety Discipline Process Documents
Reference: Safety Discipline
Customer: Honeywell Global Project Organization
End user: Honeywell Projects

Contract: N/A
Project Ref.: N/A
Subproject Ref.: N/A
Honeywell Ref.: N/A

Signature ..... Approver	Name: Rene van Falier Position: Safety Engineering Discipline Leader	Date
Signature ..... Reviewer	Name: Theo van den Bersselaar Position: Engineering Manager	Date
Signature ..... Author	Name: Rene van Falier Position: Safety Engineering Discipline Leader	Date: December 18, 2007

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Project:	Safety Discipline Solutions Binder	File Name:	0000-3100 18-SIS Project Execution Plan (SPEP)-1_01
Subproject:	Safety Discipline Process Documents		
Version:	1_01	Doc number:	MTTSP 0000-310018
Version date:	December 18, 2007	Page:	1 of 67

FDS, SDM documents – Hardware Design

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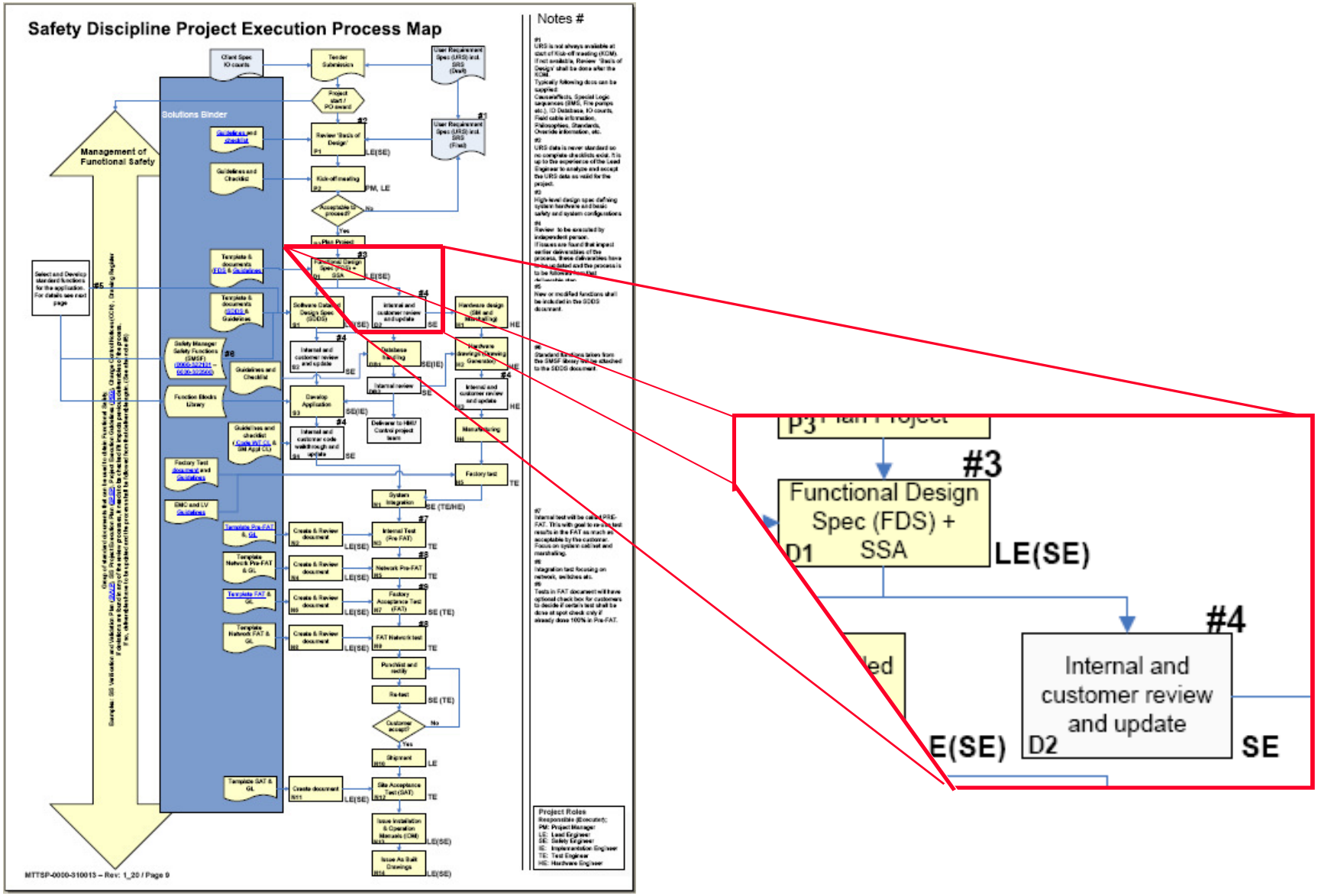

SSDS, Application Implementation & Review

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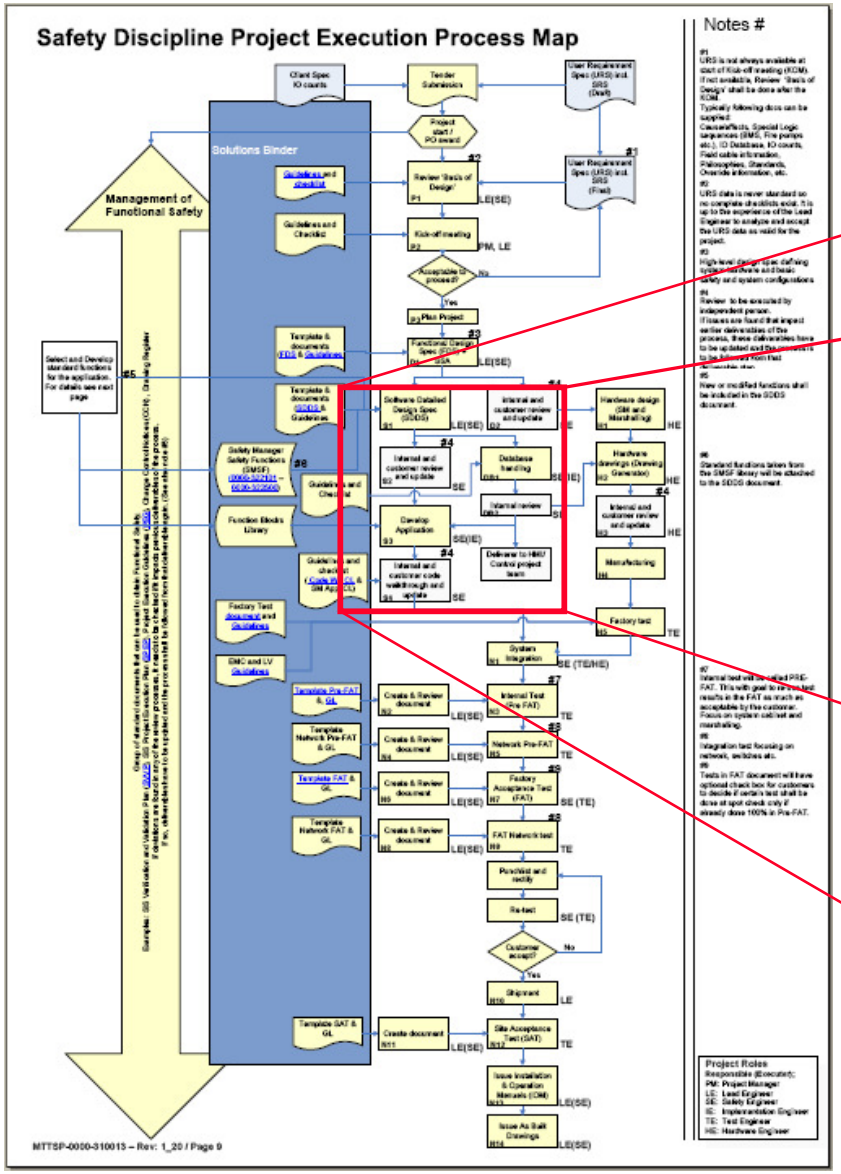
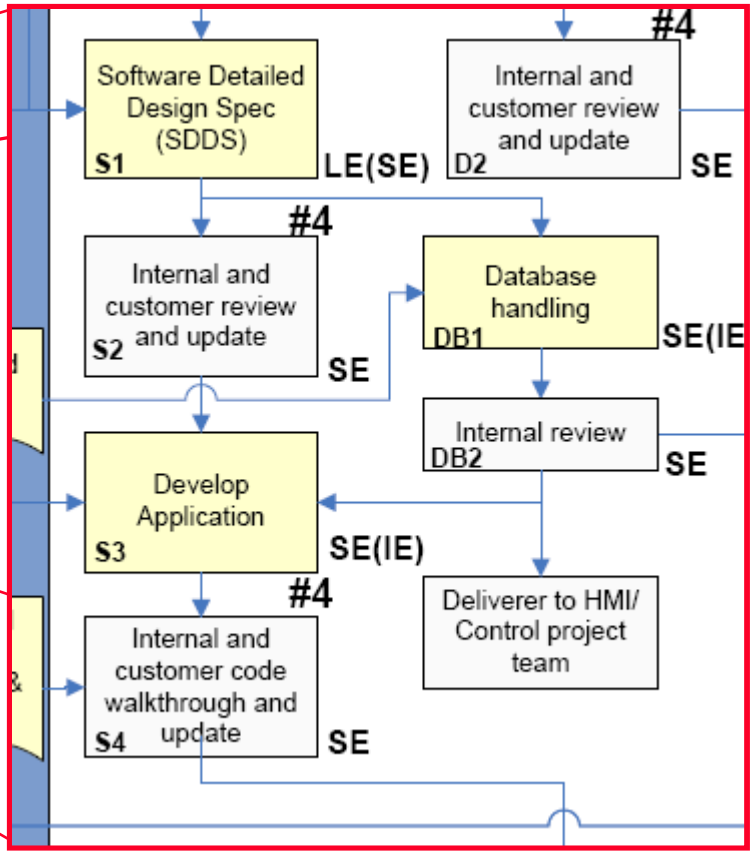
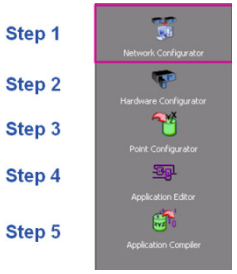


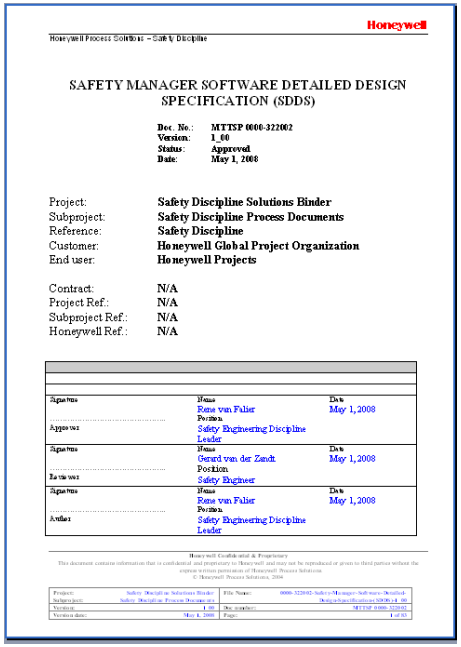


Software Detailed Design Specification (SDDS)

Honeywell

- The SDDS includes the entire application specification of the safety systems.
- It makes use of Safety Manager Standard Functions (SMSF), local or project specific standard functions whenever possible.
- SMSFs are described in dedicated SMSF documents available in the Solution Binder, which will be attached to the SDDS if applicable.
- The SDDS is the input requirement document for the application implementation.
- A Guidelines document is available in the Guidelines directory for this document




Honeywell

Honeywell Process Solutions – Safety Discipline

SAFETY MANAGER SOFTWARE DETAILED DESIGN SPECIFICATION (SDDS)

Doc. No.: MTTSP 0000-322002
Version: 1_00
Status: Approved
Date: May 1, 2008

Project: Safety Discipline Solutions Binder
Subproject: Safety Discipline Process Documents
Reference: Safety Discipline
Customer: Honeywell Global Project Organization
End user: Honeywell Projects

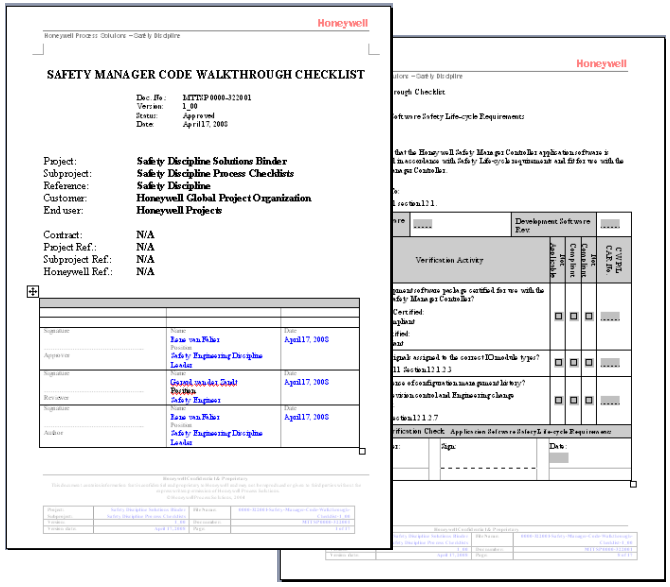
Contract: N/A
Project Ref.: N/A
Subproject Ref.: N/A
Honeywell Ref.: N/A

Signature:	Name: Rene van Faliet	Date: May 1, 2008
Approved	Position: Safety Engineering Discipline Leader	
Signature:	Name: Gerard van der Zandt	Date: May 1, 2008
Reviewed	Position: Safety Engineer	
Signature:	Name: Rene van Faliet	Date: May 1, 2008
Author	Position: Safety Engineering Discipline Leader	

Safety Manager Code Walkthrough Verification Checklist

Honeywell

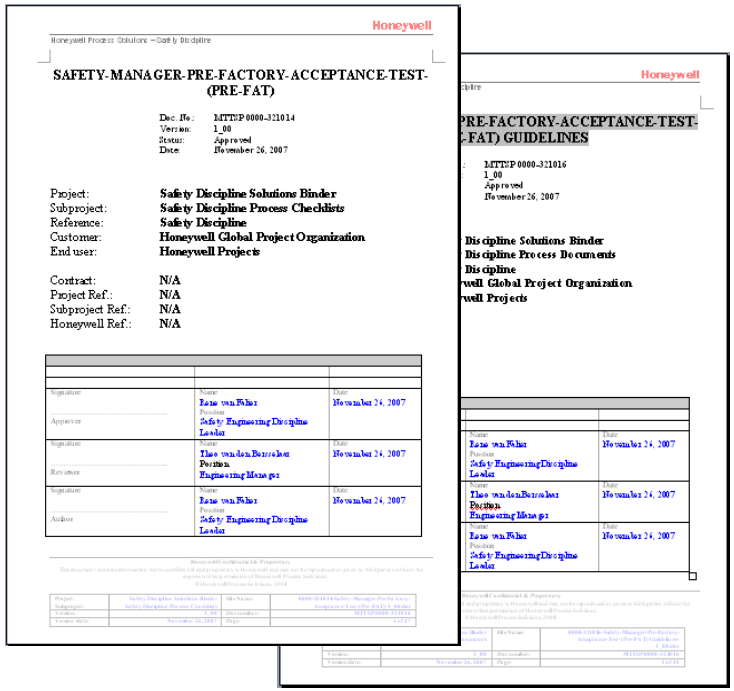
- **Key INTERNAL INDEPENDENT VERIFICATION step, immediately following completion of Internal Application Checklist; but prior to commencing pre-FAT testing.**
- **The Code Walkthrough Verification Checklist defines the following:**
  - General verification requirements
  - Verification personnel
  - Verification procedure execution and rectification of errors
- **The Code Walkthrough checklists are segregated as follows:**
  - Application Development Software Package
  - Application Software Implementation
  - Logic Application Implementation



SM Pre-Factory Acceptance Test (Pre-FAT) & Guideline

Honeywell

- **The pre-Factory Acceptance Testing is the Honeywell Internal verification & overall validation of the safety system(s) and associated interfaces, as part of the lifecycle integration phase.**
- **Pre-FAT is Honeywell preparation testing, without customer / client witness**
- **Pre-FAT tests cover the following verification & testing requirements:**
  - Factory Test Verification Review
  - Power-up Testing
  - Start up Testing
  - Redundancy and system wiring testing
  - Full functional IO testing
  - Configuration / Application Testing
  - Pre-FAT Completion Report - sign off



SM Pre-Factory Acceptance Test (Pre-FAT) & Guideline

Honeywell

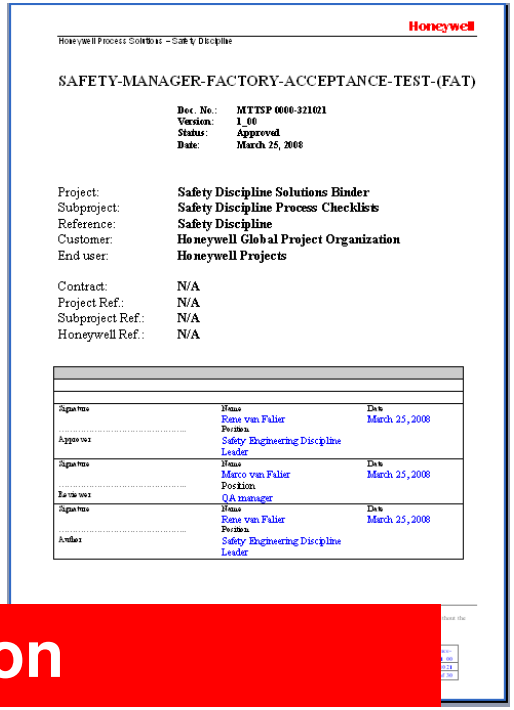
- A Pre-FAT Guideline document is available in the Guidelines directory.
- Typically one pre-FAT procedure document per system.
- The Pre-FAT Procedure or equivalent is a key TÜV certification document

Pre-FAT = Internal System Verification

SM Factory Acceptance Test (FAT)

Honeywell

- **The Factory Acceptance Testing is the Honeywell / Client verification & overall validation of the safety system(s) and associated interfaces, as part of the lifecycle integration phase.**
- **The FAT requires customer / client witness, but is NOT repeat detailed pre-FAT testing.**
- **FAT tests cover the following, inspection, verification & testing requirements:**
  - Mechanical Inspection
  - Power-up Testing
  - Start up Testing
  - Redundancy & Communications Checks
  - Sample IO testing
  - Configuration / Application Testing
  - System Interface test
  - Customer Punch List
  - Inspection Completion Note


Honeywell

Honeywell Process Solutions – Safety Discipline

SAFETY-MANAGER-FACTORY-ACCEPTANCE-TEST-(FAT)

Doc. No.: MTTSP 0000-321021
Version: 1_00
Status: Approved
Date: March 25, 2008

Project: Safety Discipline Solutions Binder
Subproject: Safety Discipline Process Checklists
Reference: Safety Discipline
Customer: Honeywell Global Project Organization
End user: Honeywell Projects

Contract: N/A
Project Ref.: N/A
Subproject Ref.: N/A
Honeywell Ref.: N/A

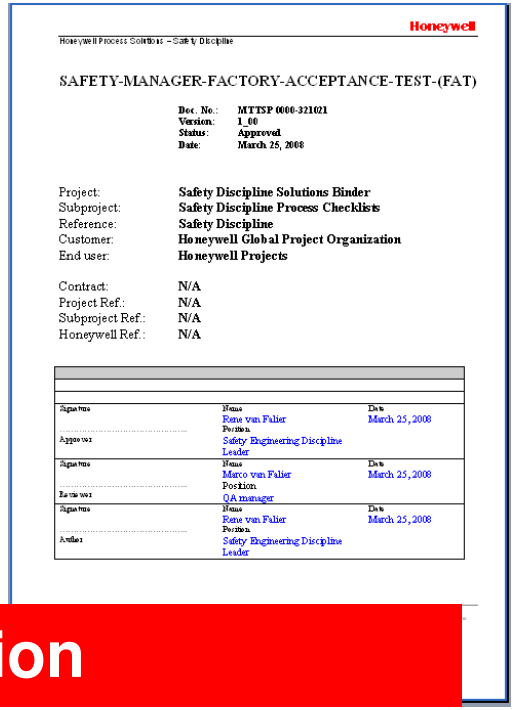
Signature	Name: Rene van Falier Position: Safety Engineering Discipline Leader	Date: March 25, 2008
Signature	Name: Marco van Falier Position: QA manager	Date: March 25, 2008
Signature	Name: Rene van Falier Position: Safety Engineering Discipline Leader	Date: March 25, 2008

FAT = Client System Verification

SM Factory Acceptance Test (FAT)

Honeywell

- A FAT Guideline document is currently under development
- Typically one FAT procedure document per system.
- The FAT Procedure is a key TÜV certification document.



Honeywell

Honeywell Process Solutions – Safety Discipline

SAFETY-MANAGER-FACTORY-ACCEPTANCE-TEST-(FAT)

Doc. No.: MTTSP 0000-321021
Version: 1_00
Status: Approved
Date: March 25, 2008

Project: Safety Discipline Solutions Binder
Subproject: Safety Discipline Process Checklists
Reference: Safety Discipline
Customer: Honeywell Global Project Organization
End user: Honeywell Projects

Contract: N/A
Project Ref.: N/A
Subproject Ref.: N/A
Honeywell Ref.: N/A

Signature	Name: Rene van Fulier Position: Safety Engineering Discipline Leader	Date: March 25, 2008
Approver		
Signature	Name: Marco van Fulier Position: QA manager	Date: March 25, 2008
Reviewer		
Signature	Name: Rene van Fulier Position: Safety Engineering Discipline Leader	Date: March 25, 2008
Author		

FAT = Client System Verification

SM Site Acceptance Test (SAT)

Honeywell

- **The Site Acceptance Test Procedure is a combined guideline and procedure with embedded verification checklists associated with the SAT integration phase of the lifecycle.**
- **Typically, the SAT is carried out with the client or nominated representative(s), as a witness, as described in the procedure, ensuring all checklists and internal approval sign-off for each section is completed, to demonstrate the following:**
  - Successful transportation of system and marshalling cabinets to the client's site.
  - Correct installation of system and marshalling cabinets by inspection.
  - Pre-power and power up checks of the equipment.
  - System diagnostics testing.
  - Interfaces testing with other associate systems and equipment.
  - The system is ready for commencement of site pre-commissioning and commissioning.

Safety Manager Safety Functions (SMSF)

Honeywell

- **Safety Manager Safety Functions are standard (global) proven in use functions that can and shall be used in all applications.**
- **Functions are efficient, make optimum use of the system strengths, are clear and understandable.**
- **Use of standard functions globally will also help after market services and reduce user errors.**
- **SMSF documents contain:**
  - Clear descriptions
  - Hardware connection and system configuration if applicable
  - Example FLDs and actual Function Blocks.
  - Interface to Experion HMI including reference to applicable HMI solution documents.

Available SMSF

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MTTSP-0000- 322101	IR Point Gas detector
MTTSP-0000- 322102	Combustible Gas detector
MTTSP-0000- 322103	Toxic Gas detector
MTTSP-0000- 322104	Flame detectors UV, IR, multi IR
MTTSP-0000- 322105	Flame detectors UV-IR
MTTSP-0000- 322106	Open Path Gas detectors
MTTSP-0000- 322107	Smoke and heat detector non-IS
MTTSP-0000- 322108	Fire detector
MTTSP-0000- 322111	Inhibit function 1 out of N
MTTSP-0000- 322112	Inhibit function M out of N
MTTSP-0000- 322113	Latch Normally De-energized signals
MTTSP-0000- 322114	Linemonitored DO with TDOL FTA
MTTSP-0000- 322201	MOS function 1 out of N
MTTSP-0000- 322202	Latch Normally Energized signals

Available SMSF – (Continued)

Honeywell

MTTSP-0000- 322301	Protection divide by zero
MTTSP-0000- 322302	Protection Maximum value Float-to-Word conversion
MTTSP-0000- 322303	Protection Square Root negative value
MTTSP-0000- 322304	Protection Maximum Timer value
MTTSP-0000- 322305	Protection Maximum Counter value
MTTSP-0000- 322306	Median Selection
MTTSP-0000- 322307	Dead Band
MTTSP-0000- 322308	2 out of 3 H-HH Trip function
MTTSP-0000- 322309	2 out of 3 L-LL Trip function
MTTSP-0000- 322310	Lamptest
MTTSP-0000- 322311	Step function
MTTSP-0000- 322312	PID function
MTTSP-0000- 322313	Pack (16 DI to one register) function
MTTSP-0000- 322314	Unpack (One register to 16 DI) function

Available SMSF – (Continued)

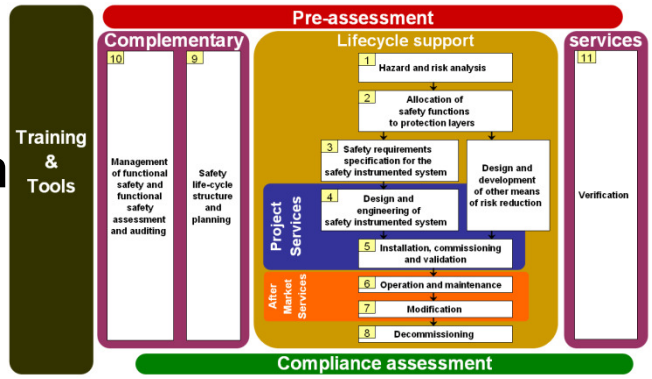
Honeywell

MTTSP-0000-	322315	Safety Device Input (SDI)
MTTSP-0000-	322316	First Up Alarming COM
MTTSP-0000-	322351	Emergency Stop with Auto reset
MTTSP-0000-	322352	Emergency Stop without Auto reset
MTTSP-0000-	322353	Safety Interlock with Auto reset
MTTSP-0000-	322354	Safety Interlock without Auto reset
MTTSP-0000-	322355	Solenoid Safety Interlock

Overview of Current SCS Offerings

Honeywell

- Pre-assessment to determine the current status or your process facilities, people and organization
- IEC 61511 Safety Lifecycle services for each phase of the lifecycle
- Complementary services related to requirements of IEC 61511 regarding:
  - Management and organization of Functional Safety
  - Verification services
  - Functional Safety Audits
  - Functional Safety Assessments
- TÜV certification
- Training Services on Functional Safety an SIS



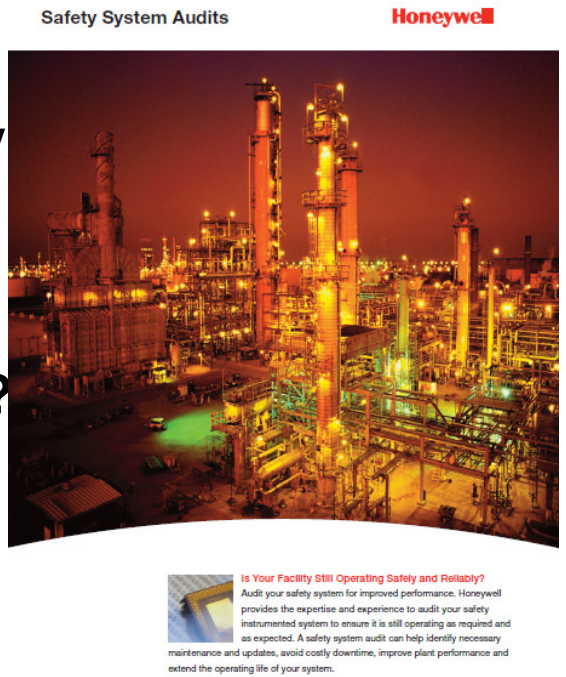
Safety Systems Audit

Honeywell

Audit the current condition of the Safety System.

The audit will answer customer questions:

- **Is my system designed in a correct way?**
- **Is the environment effecting my system?**
- **Did modifications affect the safety & reliability of my system?**
- **Are diagnostics messages showing a hidden issue?**
- **Is system maintenance done in a correct way?**



Is my system running safe & reliable?

Safety Engineering Applications?

Honeywell

Questões?