Think beyond SIL and discover cost-efficient risk management

HIMA

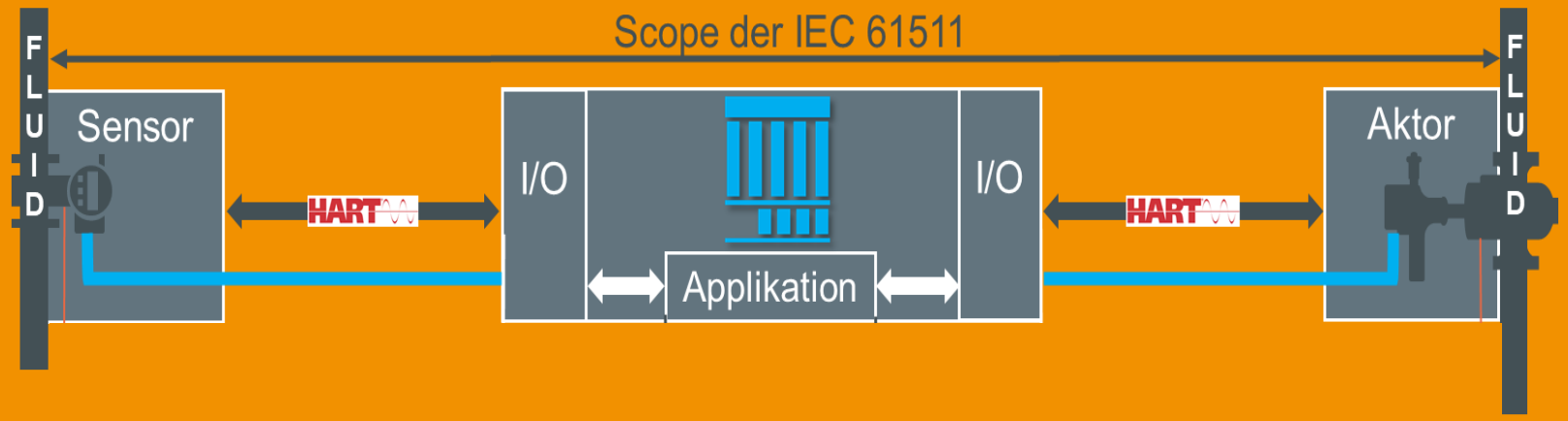
SMART SAFETY.

#safetygoesdigital

Speaker: Fred Stay / Safety Consultant at HIMA

NAMUR

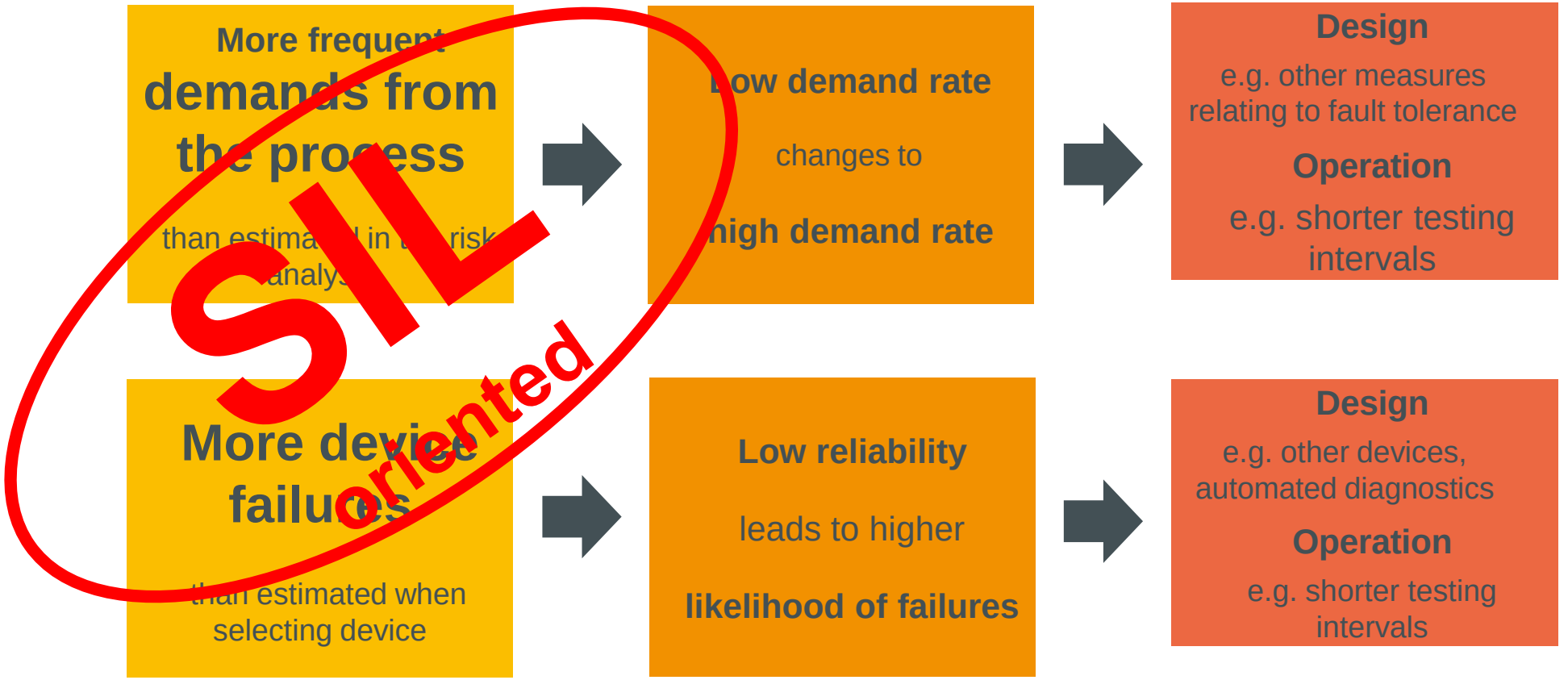
What is the difference between Safety KPI and KPI of a safety system?



Safety Performance Indicators

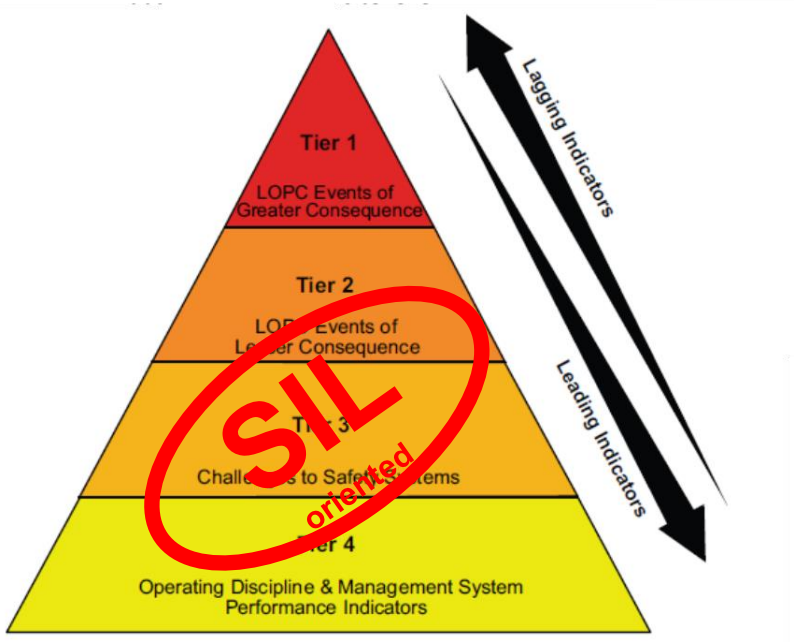
acc. to IEC61511 Chapter 16

Consequences of deviating from planning schedule



Process Safety Performance Indicators

acc. ANSI / API RP-754



Process Safety Indicator Pyramid, Source: ANSI / API RP-754

Challenges to Safety Systems (Tier 3)

The standard provides **four indicators** for consideration

- **Safe Operating Limit Excursions**
- **Primary Containment Inspection or Testing Results Outside Acceptable Limits**
- **Demands on Safety Systems**
- **Other LOPC Events**

„Companies may use these four or develop their own“

e.g.

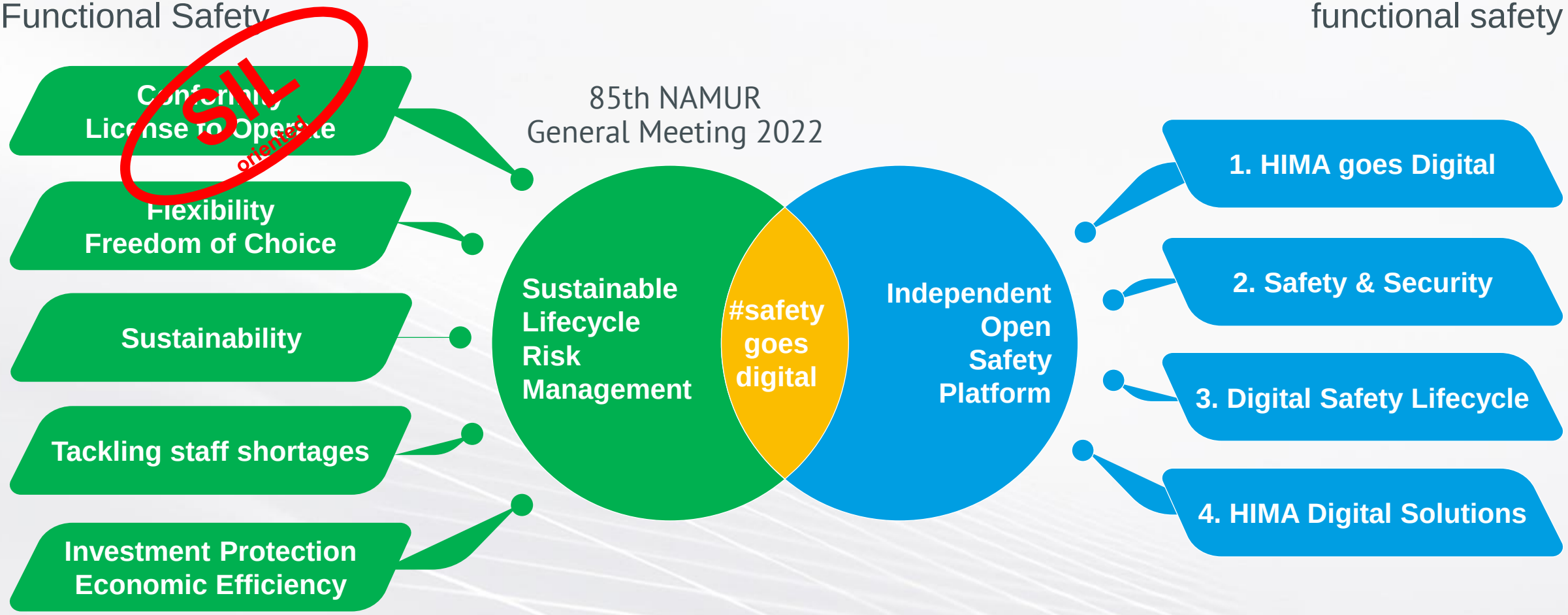
- **Number of Bypass Activations (unplanned)**
- **Exceeded Bypass Activation time**
- **Etc.**

SIL oriented

KPIs of a safety system

Alignment of perspectives

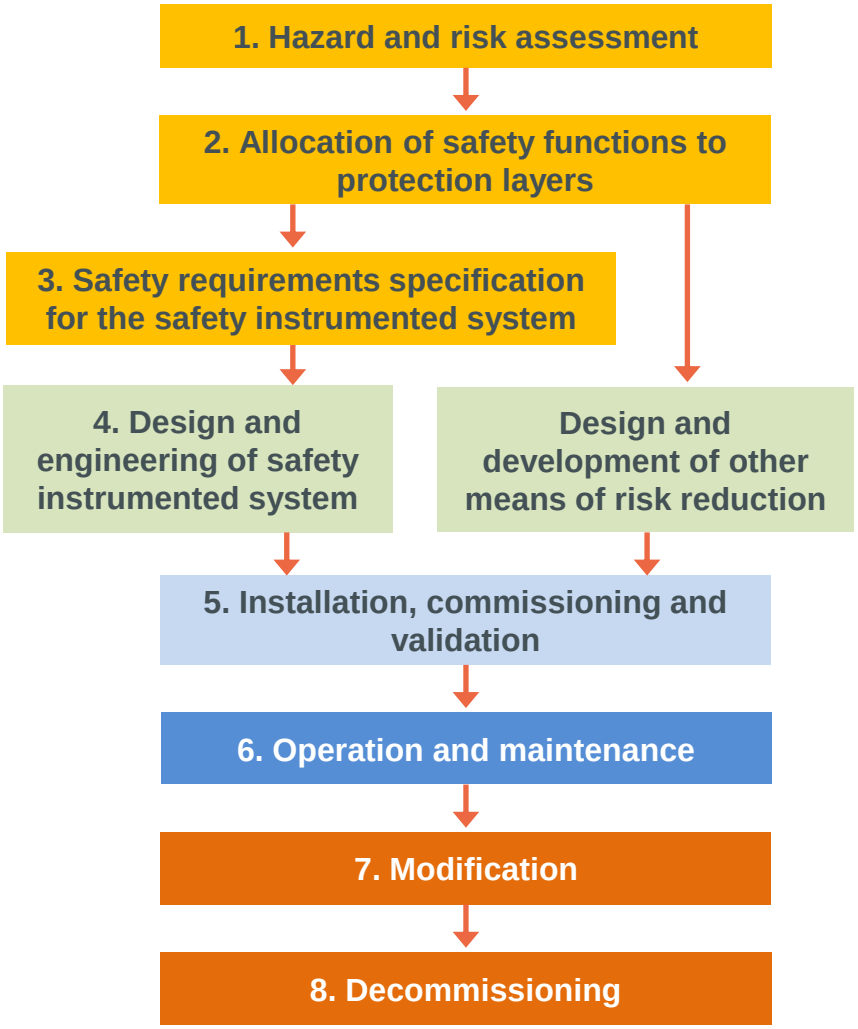
Requirements of the operators for Functional Safety



HIMA approach to the digitalization of functional safety

We need to define KPI also for the other areas!

Problem: Safety Lifecycle Fragmentation



SIS Lifecycle, Quelle DIN EN IEC 61511

Activity	Responsible Today	Data Management Today
HAZOP, LOPA, Safety Case	Customer / EPC Contractors / HIMA / Freelancers	Excel, PHA Pro, ExSILentia
		LOPA Spreadsheet Excel
SRS development, SIL Compliance, Hardware/ Software design, FAT	Engineering Companies/ Freelancers	Design Documents, Specification sheets, Drawing Manual, Comos
	System Integrators, SIS vendors, HIMA	
SAT, Functional Safety Assessment, Proof Tests	System Integrators, HIMA	Excel, Paper Documentation, SharePoint
	Customer´s Personal	Oracle, SAP, Access

The Volume of Data is Overwhelming

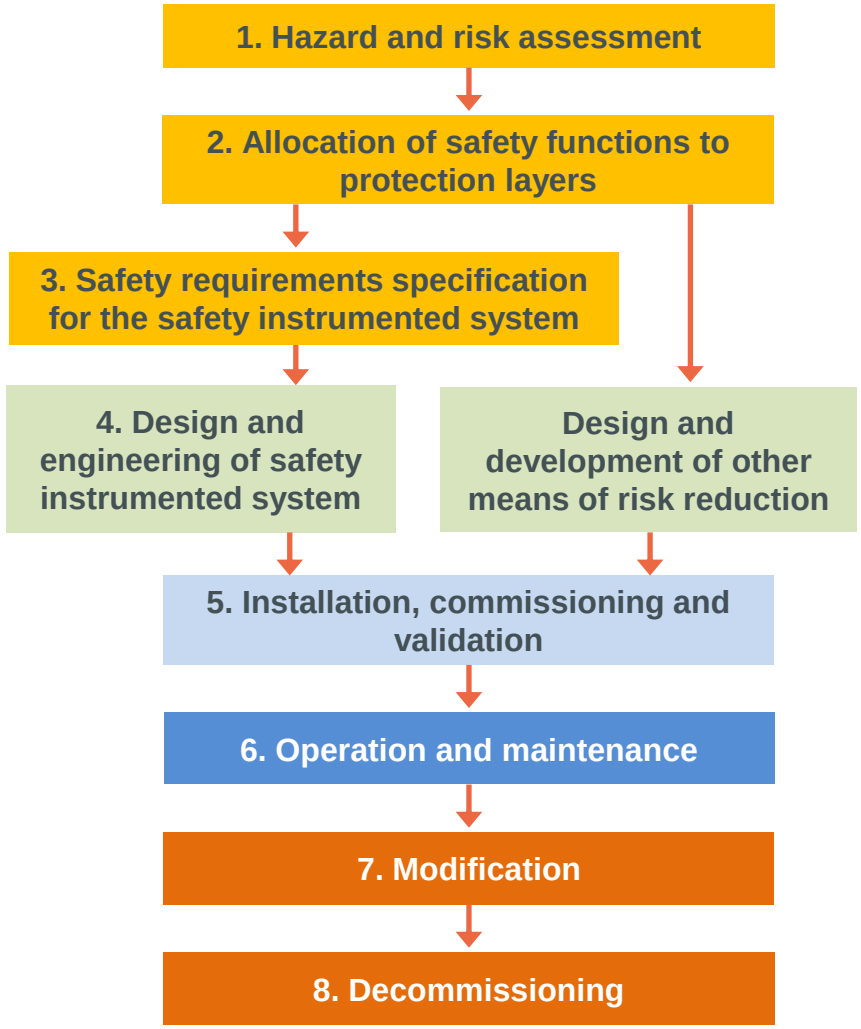
Every Safety System
has binders of Information and
creates huge amount of data

Limited Access. Silos. Data Searching and Searching. Multiple Software approaches.
Multiple file versions.
Unused Data

KPI tracking on this basis is suspect.

How **effective** and **efficient** are decisions being made?

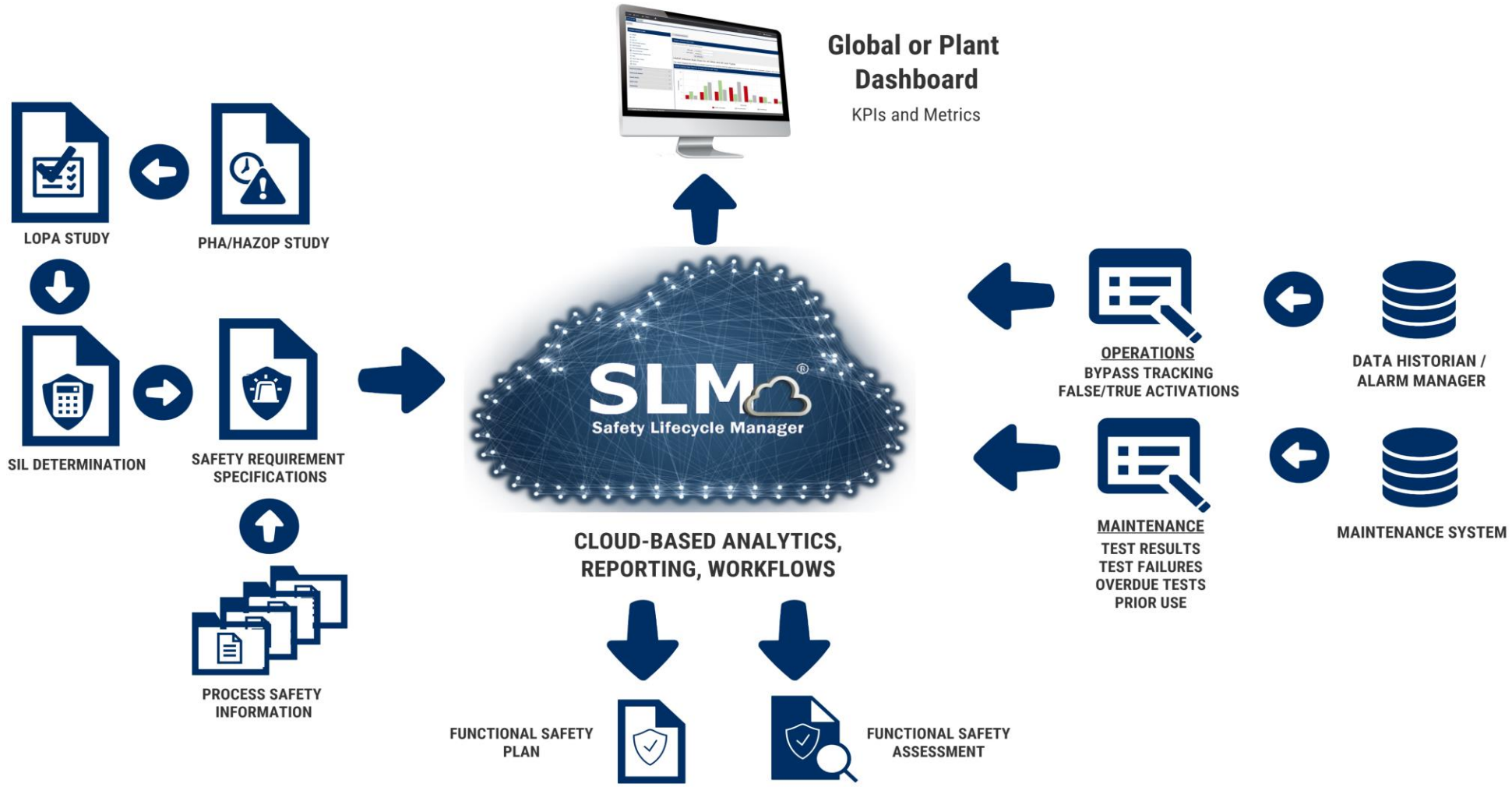
SL Fragmentation – the Remedy: Digitalization



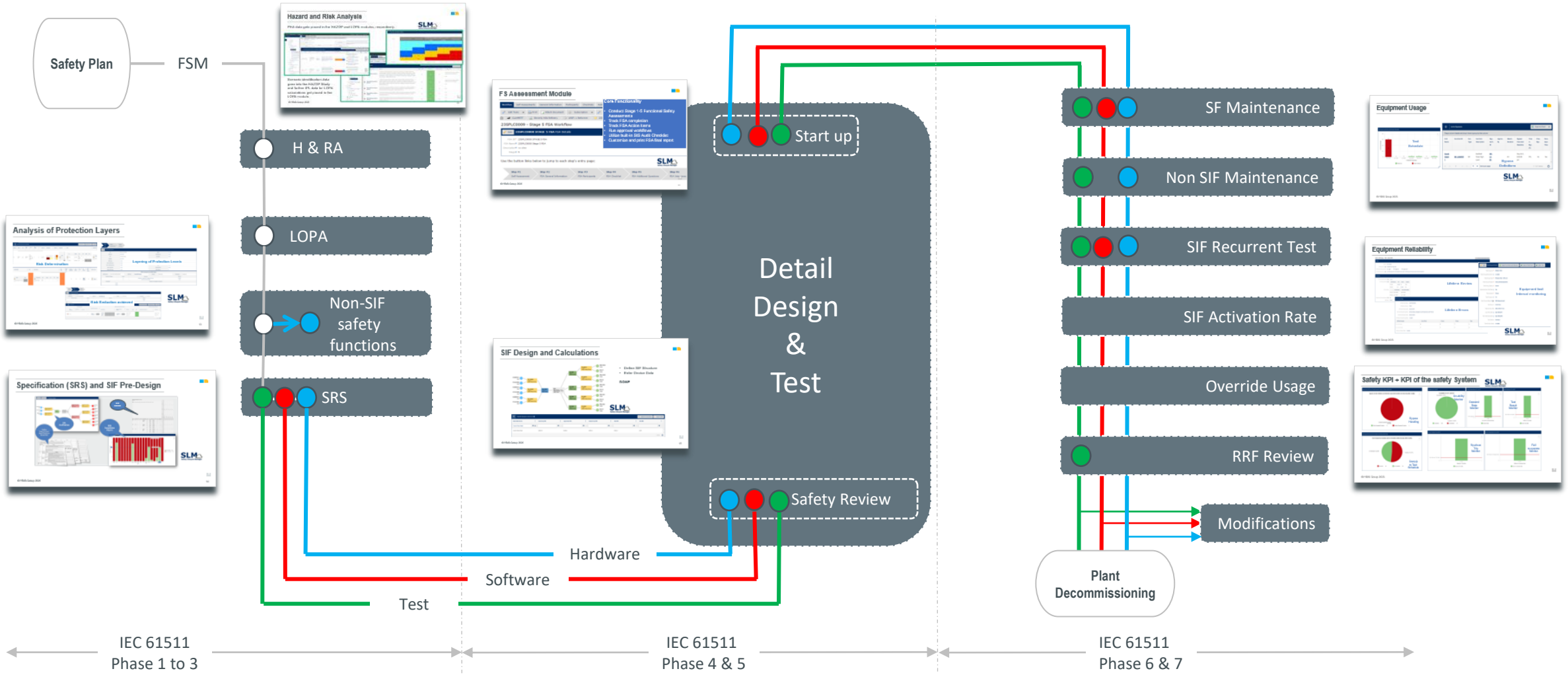
SIS Lifecycle, Quelle DIN EN IEC 61511

Activity	Responsible Today	Data Management Today	Efficient Data Management
HAZOP, LOPA, Safety Case	Customer / EPC Contractors / HIMA / Freelancers	Excel, PHA Pro, ExSILentia	single digital Platform
		LOPA Spreadsheet Excel	
SRS development, SIL Compliance, Hardware/ Software design, FAT	Engineering Companies/ Freelancers	Design Documents, Specification sheets, Drawing Manual, Comos	
	System Integrators, SIS vendors, HIMA		
	System Integrators, HIMA	Excel, Paper Documentation, SharePoint	
SAT, Functional Safety Assessment, Proof Tests	Customer´s Personal	Oracle, SAP, Access	

Single Source of Truth- Lifecycle Management Platform

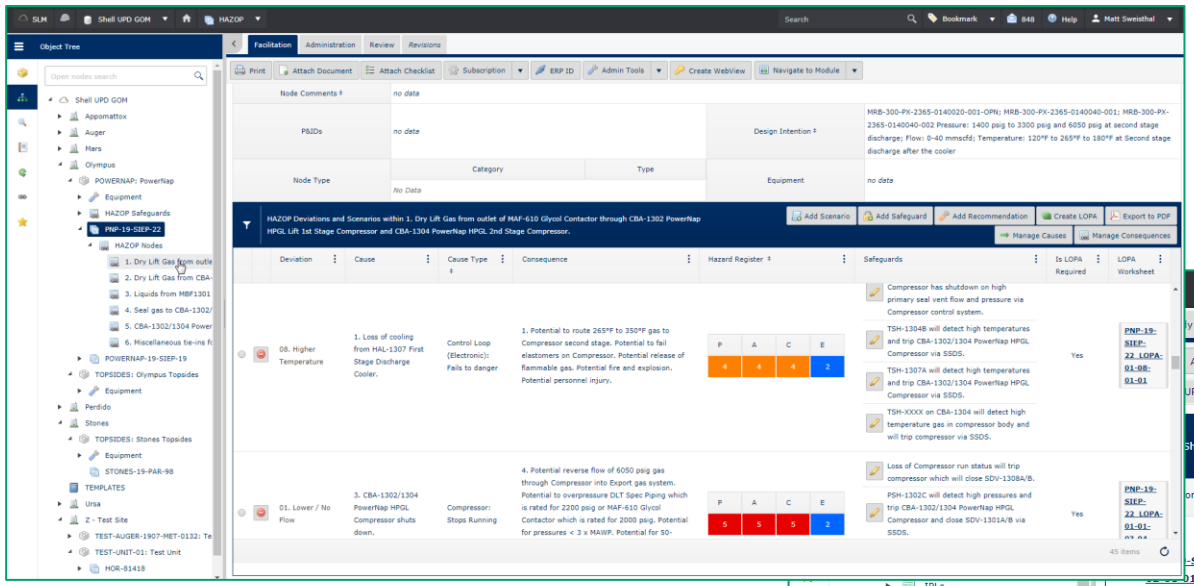


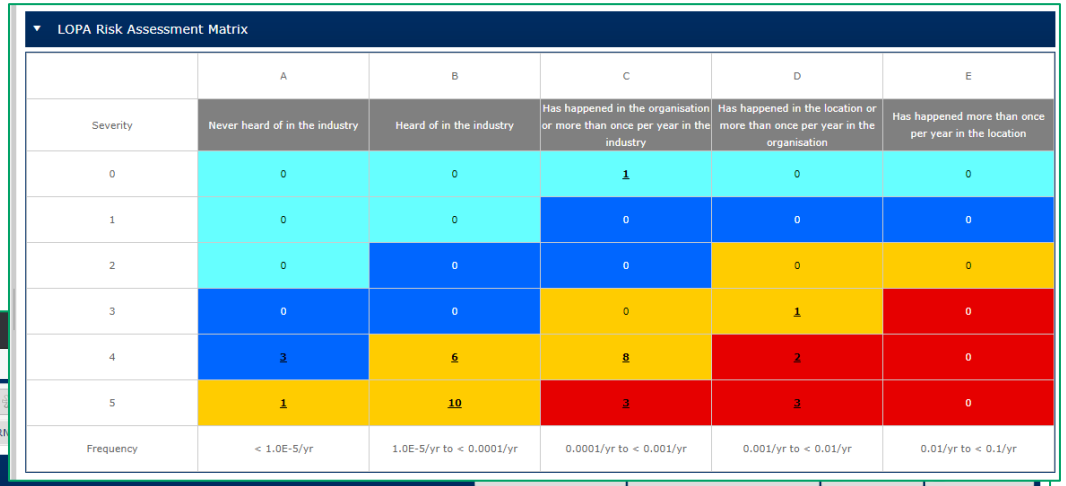
End-to-end Digitalization of all Phases & Workflow



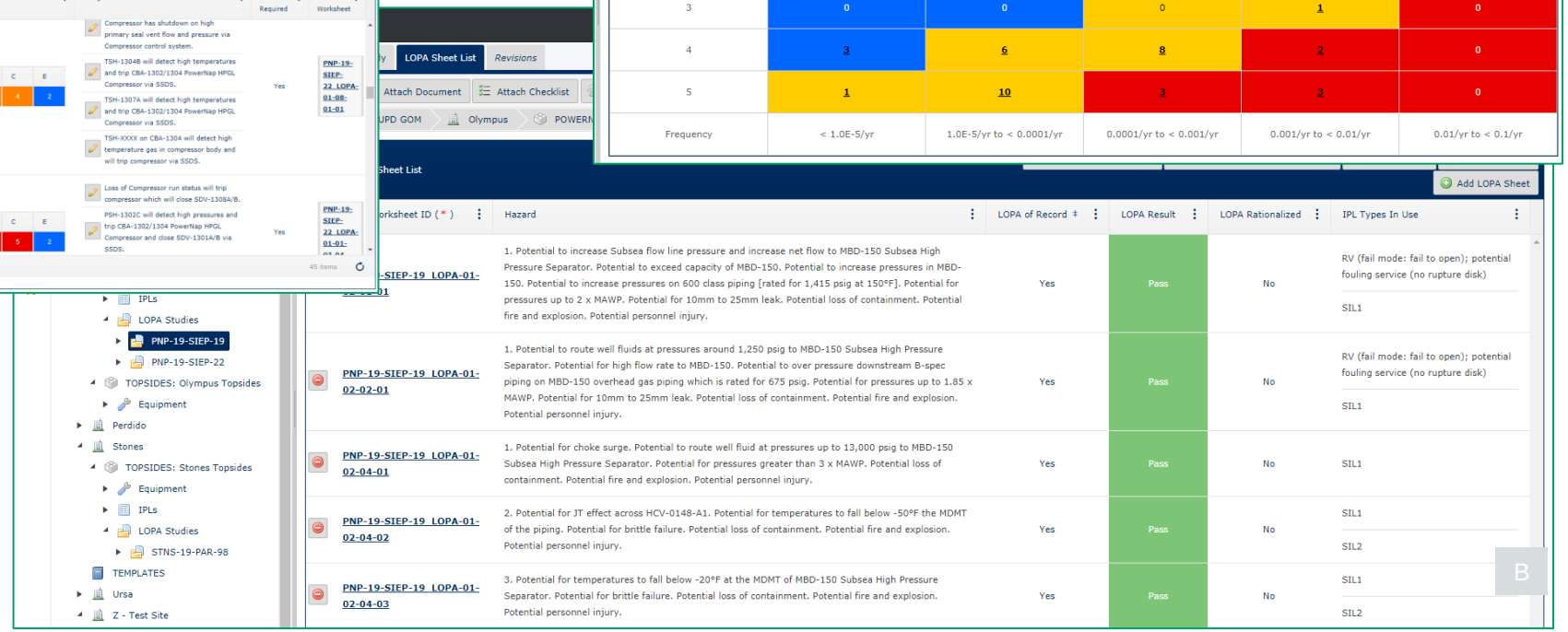
Hazard and Risk Analysis

PHA data gets placed in the HAZOP and LOPA modules, respectively.



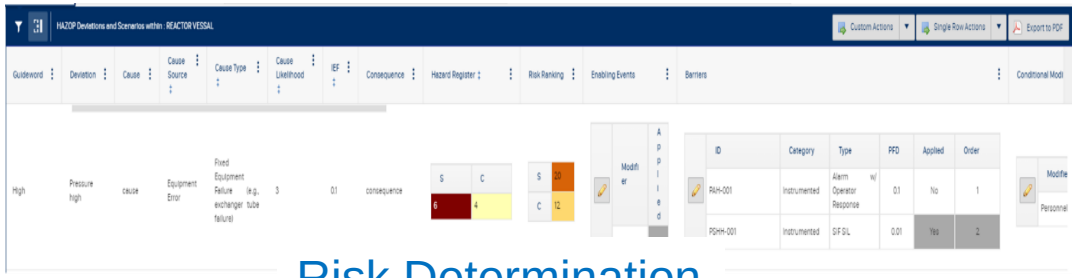


Severity	A Never heard of in the industry	B Heard of in the industry	C Has happened in the organisation or more than once per year in the industry	D Has happened in the location or more than once per year in the organisation	E Has happened more than once per year in the location
0	0	0	1	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	1	0
4	3	6	8	2	0
5	1	10	3	3	0
Frequency	< 1.0E-5/yr	1.0E-5/yr to < 0.0001/yr	0.0001/yr to < 0.001/yr	0.001/yr to < 0.01/yr	0.01/yr to < 0.1/yr

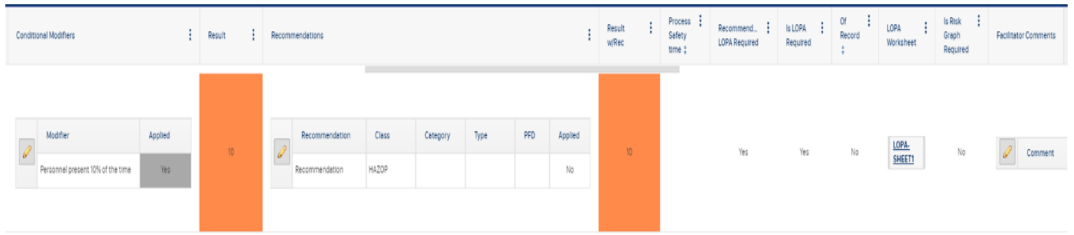


Scenario identification data goes into the HAZOP Study and further IPL data for LOPA calculations get placed in the LOPA module.

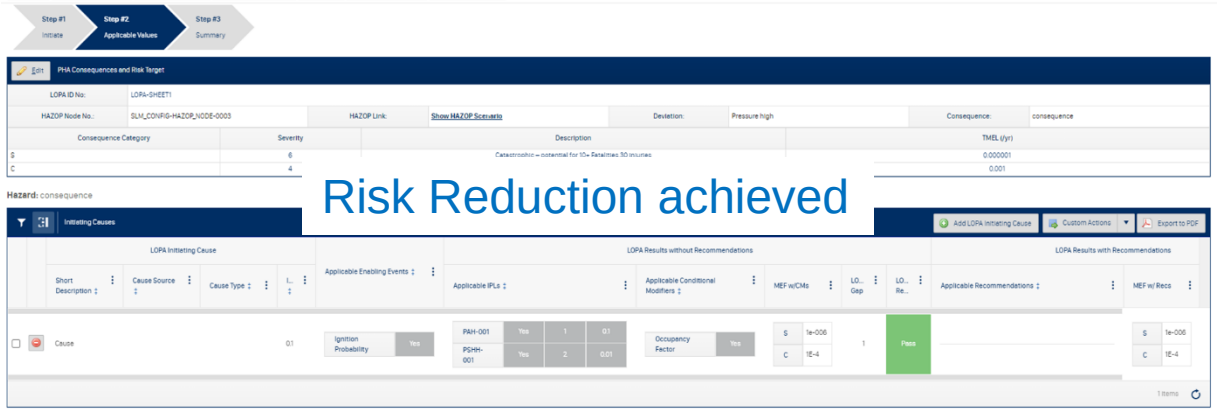
Analysis of Protection Layers



Risk Determination



Layering of Protection Levels



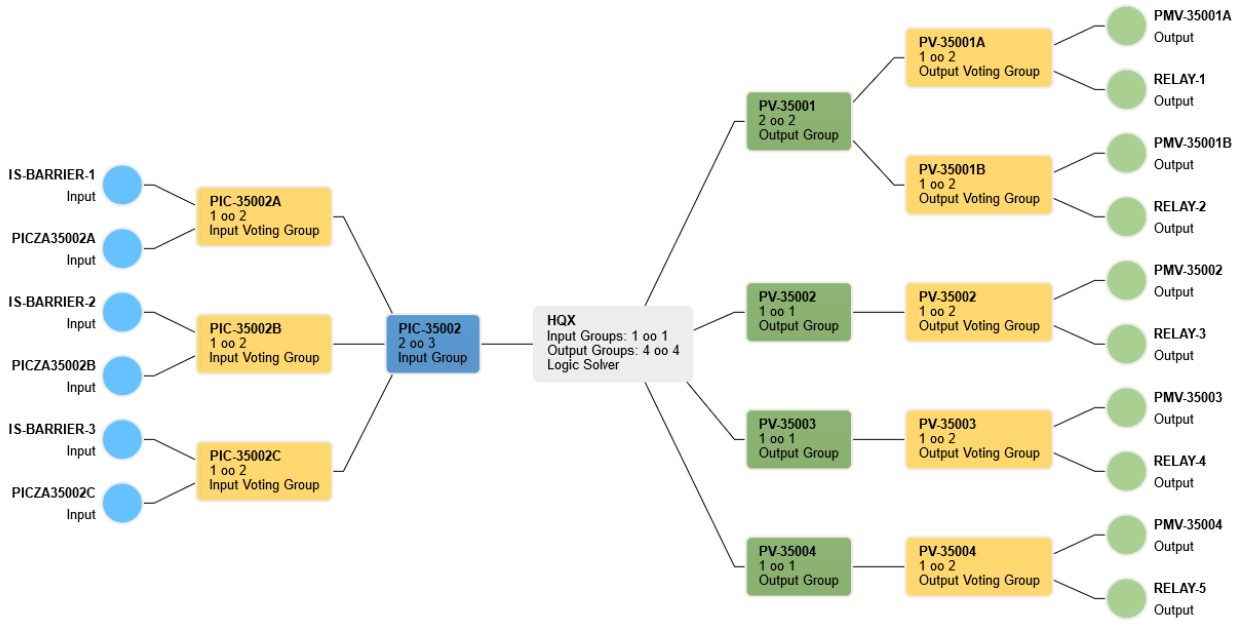
Risk Reduction achieved

SLM Safety Lifecycle Manager

Specification (SRS) and SIF Pre-Design

SLM Safety Lifecycle Manager

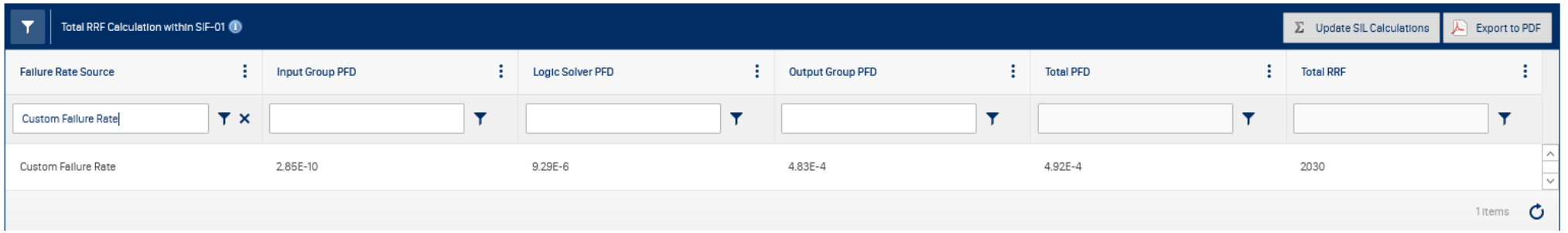
SIF Design and Calculations



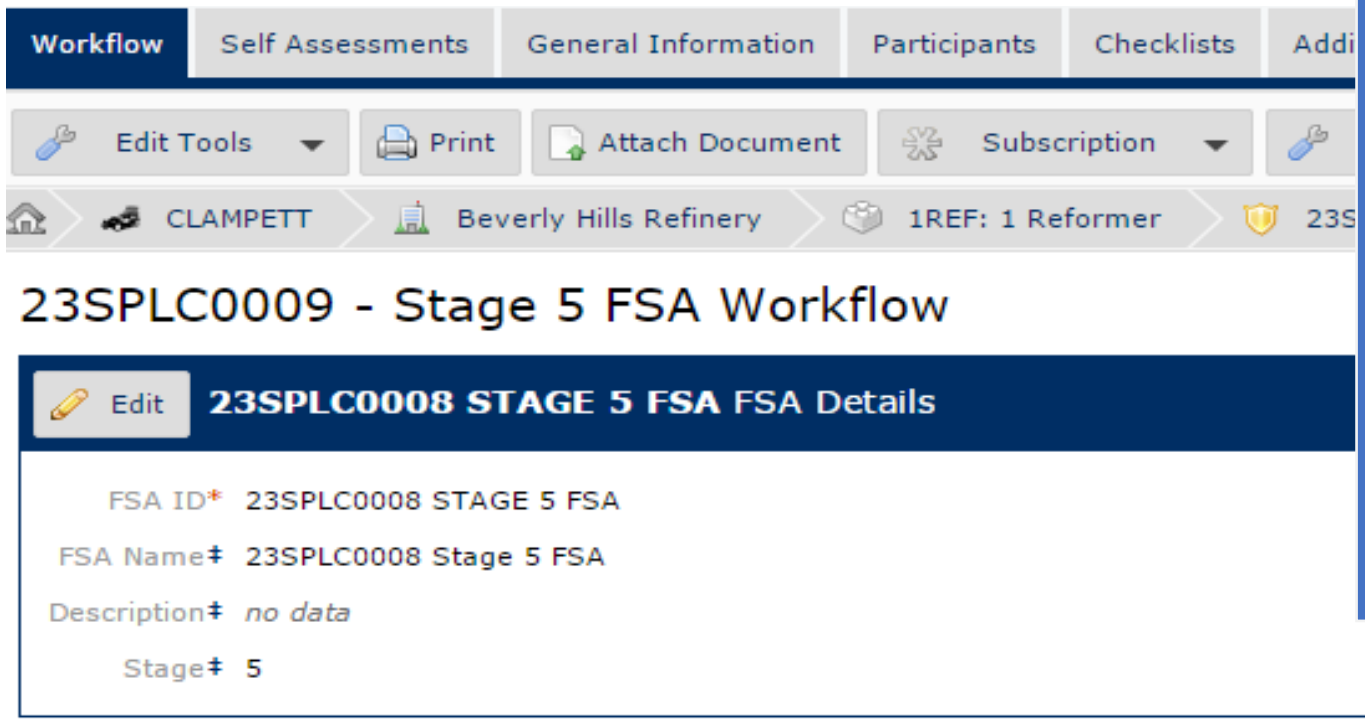
- Define SIF Structure
- Enter Device Data

DONE

SLM
Safety Lifecycle Manager



FS Assessment Module



Core Functionality

- Conduct Stage 1-5 Functional Safety Assessments
- Track FSA completion
- Track FSA Action Items
- Run approval workflows
- Utilize built-in SIS Audit Checklist
- Customize and print FSA final report

SLM Safety Lifecycle Manager

Equipment Reliability

SIF O-M Data - SIF-LAHH107

View Instrumented Systems Data

SIF Data

SIF ID *: SIF-LAHH107

SIF Description ‡: GasStab1 Tower High Level

Performance Requirements: SIL ‡: 3 RRF ‡: 3310 PFD ‡: 3.02E-4

Functional Description ‡: 2oo3 High high level in the GasStab1 Tower shuts in the feed pump P102 and closes the feed valve SDV107

Testing Data

SIF Testing Requirements: *no data*

SIF Testing Intervals ‡:

Test Intervals	SIF	Inputs	Outputs
On-Line	*no data*	1 yr	3 mo
Off-Line	5 yr	*no data*	5 yr

SIF Test Dates:

	Last Test Date	Next Test Due Date
On-Line	Sep-14-2018	Sep-14-2018
Off-Line	Jan-11-2019	Jan-11-2024

Partial Stroke Testing Required?: Yes

Test Status: Current

Lifetime Review

Performance Data

SIF Service Status: Commissioned

SIF Service Hours: 41137

SIF Commission Date: Oct-23-2014

SIF Commissioning Notes: Service Status changed to Commissioned on 2014-10-23

SIF Decommission Date: Dec-03-2013

SIF Decommissioning Notes: *no data*

SIF Performance	Life of Plant	5 Years	3 Years	1 Year
No. of Failures	8	8	7	0
No. of Demands	7	7	7	0

In Service Failure Rate: *no data*

Lifetime Errors

Edit | Test Group General | Select Functions and Devices | Record Test Event | Defer Test

Test Group ID *: PROOF-TEST

Test Group Description ‡: *no data*

Test Group Type *: Periodic Test - Off Line

Test Group Module *: Instrumented Systems

Test Group Status *: Active

Optimize Next Test Date ‡: Yes

Test Interval *: 24 mo

Test Duration ‡: 3 h

Test Interval Basis ‡: SRS Requirement

Test Due In: 0 d (0 mo)

Test Overdue By: 464 d (15.47 mo)

Last Test Date ‡: Sep-08-2017

Next Test Due Date ‡: Sep-08-2019

Test Status: Overdue

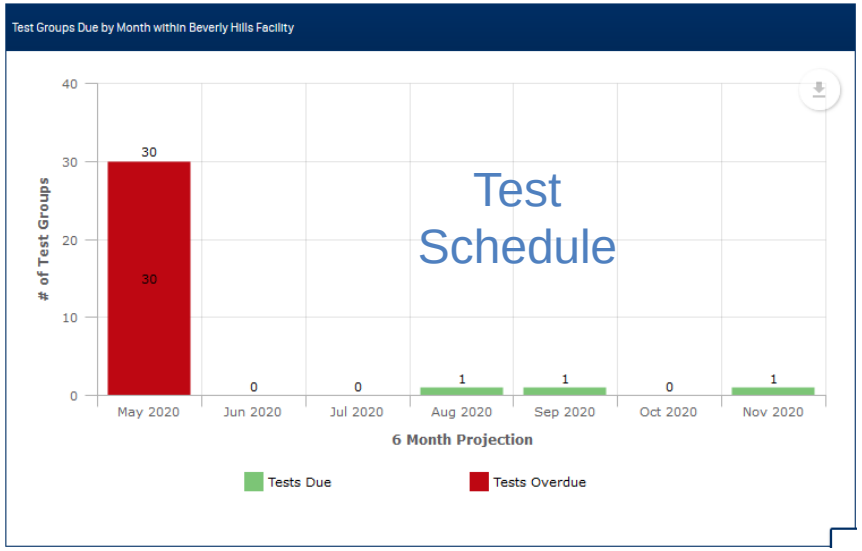
Test Group Notes: *no data*

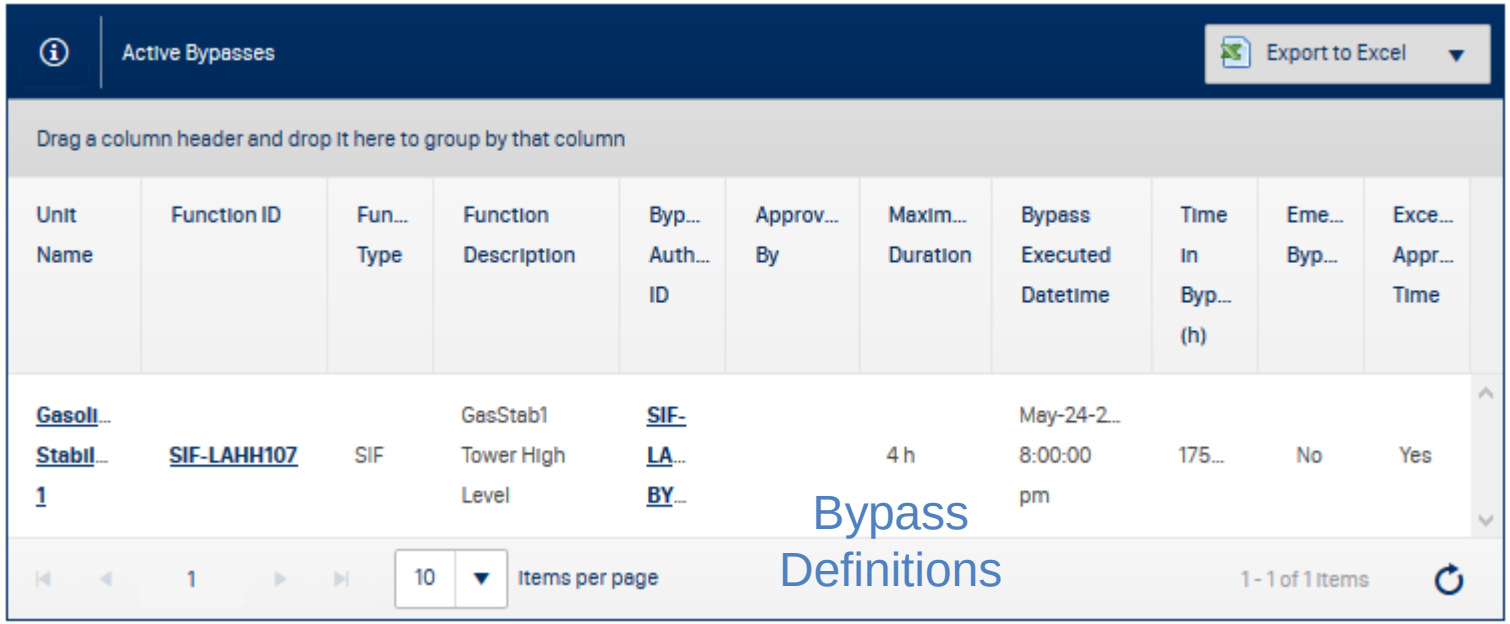
Equipment test Interval monitoring

SLM Safety Lifecycle Manager

B

Equipment Usage



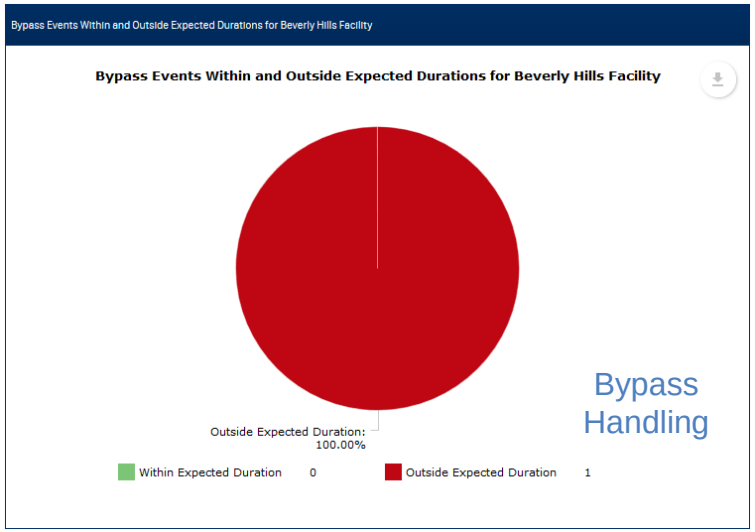


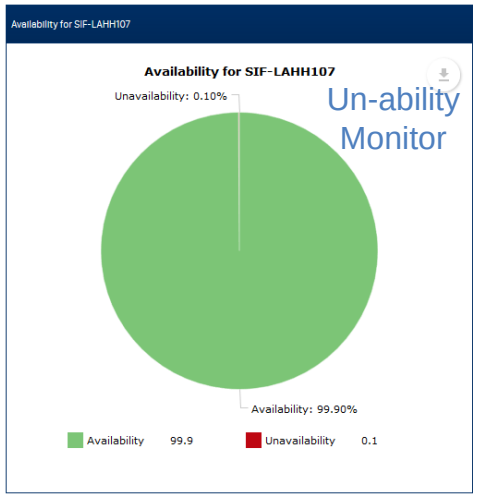
SLM
Safety Lifecycle Manager

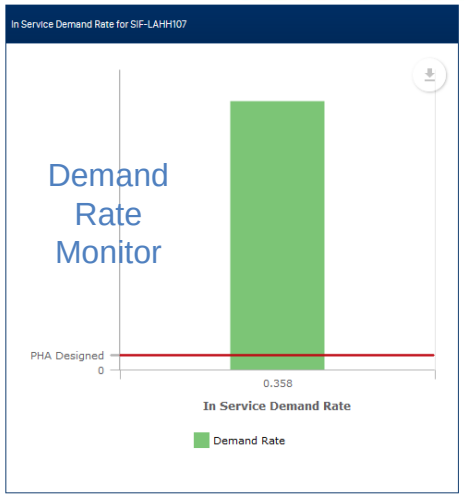
B

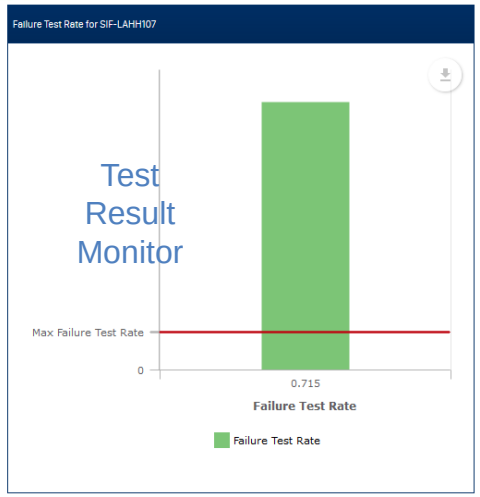
Safety KPI + KPI of the safety System

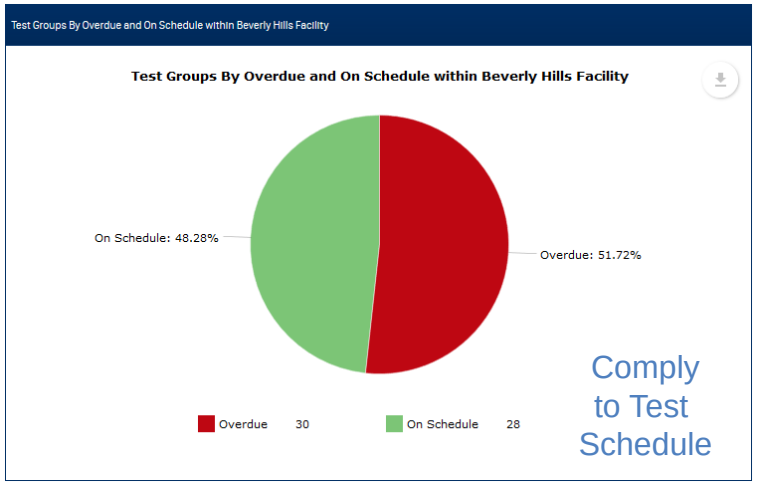
SLM Safety Lifecycle Manager

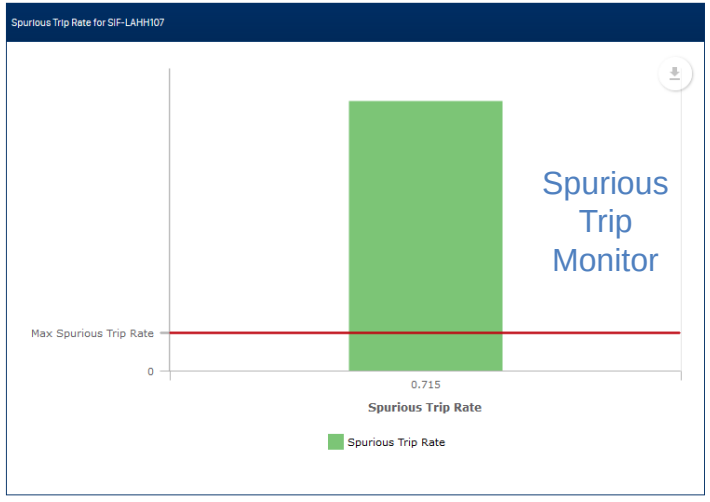


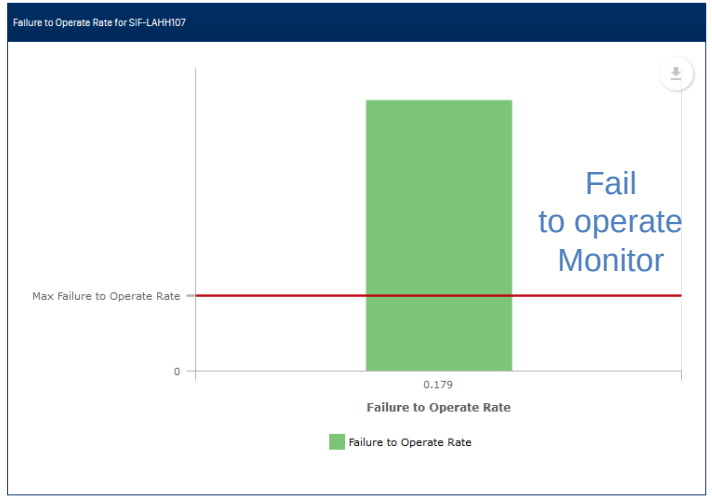












Added value from Digital Solutions

HIMA Safety Platform with Smart Safety Test

- Evaluate device diagnostics
- Partial or fully automated testing

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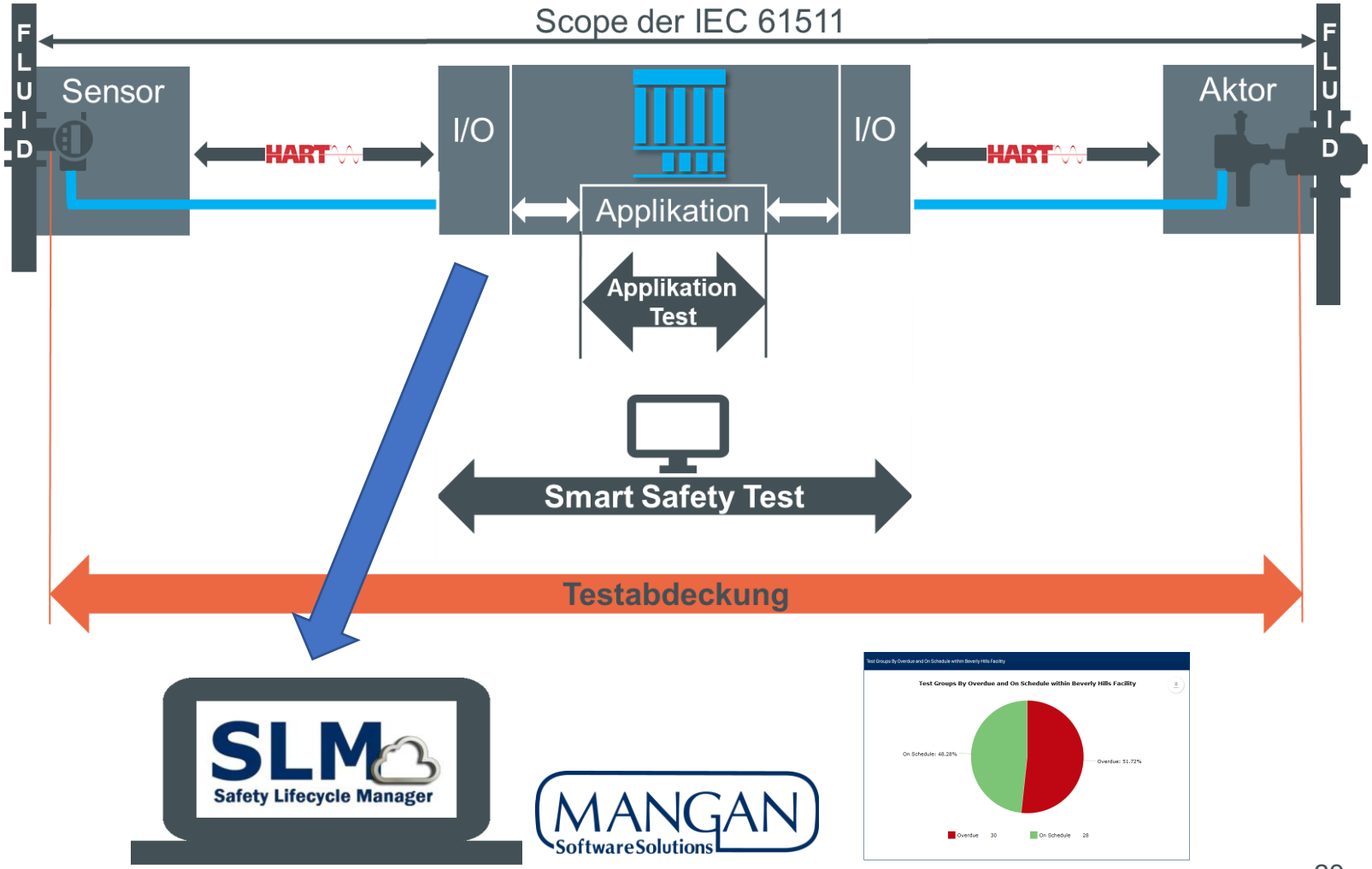
Safety Lifecycle Manager

- Advanced analysis
- Partially or fully automated reporting
- Initiation and monitoring of resulting work orders



Summary

Digitalized Safety Lifecycle provides

- **Efficient risk management** by combining and displaying the safety key performance parameters in real time
- Reliable **proof of compliance**
- **Source** to be able **to define and to measure also other KPIs**
- Seamless **traceability of safety KPIs** and safety functions back to the original hazard and risk analysis
- **"Single source of truth"** with regard to risk analyses and functional safety
- **Increased efficiency** when using latest technology

Thank You.

Fred Stay
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FS Expert (TÜV Rheinland, # 275/16 SIS)
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