

Asset Data Management for The Energy Sector

Barrier Health Monitoring Dashboard

Making the most of your own EAM

Use of third party solutions to monitor barrier performance requires additional cost for implementation and maintenance. It also means double work in data governance. What users of such services don't know is that **all of this can be performed inside their own EAM, such as SAP**.

>> STEPS TO BE DONE

Define Barriers

Define your barriers in the asset register, make them identifiable by adding performance standards and relevant functional requirements.

Define Barrier Functions

Define your safety system functions and sub-functions.

Define Redundancies

Define your safety system redundancy levels and redundant objects.

Define Hazards

Define hazards for locations based on your risk assessment documentation.

Define Barrier Performance Indicators

Define the appropriate barrier performance influencing indicators and performance criterias based on your performance standards and bowtie diagrams.

Separate Assurance Tasks

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Make your barrier performance assurance and verification tasks are identifiable, separate from routine maintenance tasks, but at the same time aligned with them.

Configure Indicator Monitoring

Configure your SAP customer exit IMRC0001 to monitor barrier performance.



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Esablish Health Determination Approach

Establish the barrier, system, location, and plant health determination approach by adding value to the relevant objects in SAP S/4 HANA.

Create User-fiendly Dashboard





>> DOCUMENTATION



It is required by regulatory requirements to know:

- Barrier functions
- Technical barriers
- Operational barriers
- Organisational barriers
- Performance criteria
- Acceptance criteria



This information is a vital part for the installation of:

- HAZID
- HAZOP
- HSE case
- Bow-Tie diagrams
- Performance standards
- Written Schemes of Verification (WSV)
- etc.

Usual Approach:

Data is accumulated in different places. Additional work is required to transfer it between the systems.

IMPLEMENTATION APPROACHES

Implemenation Inside SAP S/4 HANA:

All data is accumulated in one place. This full overview will allow you to deliver more detailed results.



BENEFITS OF BARRIER MONITORING WITHIN SAP

When implementing into SAP, there is no need for any third party system. This has a lot of benefits and makes the SAP S/4 HANA one integrated system. The dashboard should incorporate the following features:

Provide Overview

The system should give full overview of the current risks.

Show History

Full history of the barrier performance should be available.

Inform

An operator should be informed which barrier function has failed.

Indicate Problems

It should clearly indicate problematic safety systems and effect on other areas.

⊘ ⊘ Show Aspects

Aspects affected by the failure of a single barrier should be monitored.

Pマ Be Easy to Update

All the future system updates should be easy to implement.

Be Easy to Read

The provided overview should be readable and understandable for C-level users and authority auditors.

>> DETERMINING BARRIER WEIGHT

It is a good approach to determine barrier weight and incorporate technical barrier redundancy for a **more precise risk overview**. It can be done by utilizing reliability block diagram approach in conjunction with bow-tie-diagrams.

>> DEVELOPING AN ALGORITHM FOR DATA ANALYSIS

- Asset register should be set up in a hierarchical way;
- Every barrier has to have specified location were it is physically installed;
- Every barrier has to have reference to performance standard(s) and performance requirements;
- Every barrier has to have a set of barrier performance indicators with specific reference to performance requirement(s);

- Every barrier has to be identified;
- Every location has to have assigned possible hazards that can have an affect on it;
- Maintenance with included assurance and verification activities should be identifiable and separate from general maintenance routines;
- Every related object in SAP S/4 HANA should have weight.

>> DASHBOARD USER INTERFACE

User interface of the application is made with an ALARP approach to make it easily understandable and informative, but at the same time not overloaded with information.

LEVEL 1: Overall Plant Level

The home screen visualizes the risk picture by location and provides statistical overview of the main barrier performance criteria.

Barrier monitoring dashboard 👻						۹ ۴ 🧯	
Level 1							
Risk Score Change Trend Over Time		Plant Cumulative Score	Or	ganizational Barrier	s Operation	al Barriers	
		708		102		98	
Plant Health Status		Threats on the plant			Integrity Safety	Environment	
and the second of the second s	13 A 2 3	Location	System	Object	Event Description	Status	
Contraction of the second second		Inlet separation	System 1	XXX-YYY-ZZZ	Event 1	INFO	
	100	Inlet separation	System 1	XXX-YYY-ZZZ	Event 2	INFO	
	100	Inlet separation	System 2	XXX-YYY-ZZZ	Event 3	INFO	
	- Eliza	Inlet separation	System 3	XXX-YYY-ZZZ	Event 4	INFO	
		Acid gas removal	System 1	XXX-YYY-ZZZ	Event 5	INFO	
		Acid gas removal	System 2	XXX-YYY-ZZZ	Event 6	INFO	
		Condensate stabilization	System 1	XXX-YYY-ZZZ	Event 7	INFO	
		Condensate stabilization	System 1	XXX-YYY-ZZZ	Event 8	INFO	
	S	Condensate stabilization	System 1	XXX-YYY-ZZZ	Event 9	INFO	
		Gas dehydratation	System 1	XXX-YYY-ZZZ	Event 10	INFO	
		Gas dehydratation	System 1	XXX-YYY-ZZZ	Event 11	INFO	
	and the second	Gas dehydratation	System 1	XXX-YYY-ZZZ	Event 12	INFO	
	1 - 1 - C -	Sulphur recovery	System 1	XXX-YYY-ZZZ	Event 13	INFO	
		Sulphur recovery	System 1	XXX-YYY-ZZZ	Event 14	INFO	
		Sulphur recovery	System 1	XXX-YYY-ZZZ	Event 15	INFO	
		Gas transfer pipelines	System 1	XXX-YYY-ZZZ	Event 16	INFO	
the second s	33. S.M.	Gas transfer pipelines	System 1	XXX-YYY-ZZZ	Event 17	INFO	

LEVEL 2: Specific Process Location

Level two shows the information about the status of safety systems on a location.

Left-hand side

Barrier monitoring dashboard 🔻

SAP

Shows information about risk levels for a particular location and is represented as:

- Swiss cheese model, with risk score levels per relevant performance standards;
- Process systems with risk score levels per process systems at this location;
- Affected barrier functions at the location.

Right-hand side

Is divided into two regions and shows:

- Overall risk score for the location and its trend;
- Information per system and object which affects the location safety and is shown as risk score for this object.

Risk Score	Per Performace Standard	Per Process System Afr	ected Barrier Functions	Score Change	Trend Over Time	Area	Cumulative Score
Prevention	PC - 01 Pressurised Hy 3	PC - 02 Storage Tanks 5	PC - 04 Relief System <mark>4</mark>	NN NN 0 Jan 202:		Feb 2021	403
Control	SS - 01 Emergency Sh	SS - 02 Depressuriazat	SS - 03 Gas Detection	Threats on the	plant	Integrity	Safety Environment
	C	11	0	System	Object	Event Description	Status
	0	11	0	System 1	XXX-YYY-ZZZ	Event 1	INFO
				System 1	XXX-YYY-ZZZ	Event 2	INFO
	IP - 01 Ignition	SS - 04 Fire		System 2	XXX-YYY-ZZZ	Event 3	INFO
	Source Control	Detection		System 3	XXX-YYY-ZZZ	Event 4	INFO
	10	5		System 1	XXX-YYY-ZZZ	Event 5	INFO
		1		System 2	XXX-YYY-ZZZ	Event 6	INFO
				System 1	XXX-YYY-ZZZ	Event 7	INFO
Mitigation	PS - 01 Fire	PS - 02 PA	PS - 03 Passive	System 1	XXX-YYY-ZZZ	Event 8	INFO
linigation	Fighting System	Alarm and eme	Fire Protection	System 1	XXX-YYY-ZZZ	Event 9	INFO
	15	12	14	System 1	XXX-YYY-ZZZ	Event 10	INFO
	10		- 1	System 1	XXX-YYY-ZZZ	Event 11	INFO
				System 1	XXX-YYY-ZZZ	Event 12	INFO
				System 1	XXX-YYY-ZZZ	Event 13	INFO
Emergency Response	ER - 01 Escape and Evacuation	ER - 02 Rescue and Safety Equ	ER - 06 Emergency Po	System 1	XXX-YYY-ZZZ	Event 14	INFO
	F	10	14	System 1	XXX-YYY-ZZZ	Event 15	INFO
	C	12	14	System 1	XXX-YYY-ZZZ	Event 16	INFO
				System 1	XXX-YYY-ZZZ	Event 17	INFO

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Operational and organizational levels of the dashboard show information about the risk levels from the operational point of view.

Barrier m	onitoring dashboard 🔻					ч Д
Operational Bar	riers					
Risk Score	Per Performace Standard	Per Process System Af	ected Barrier Functions	Score Change	Trend Over Time	Cumulative Score
Prevention	PC - 01 Pressurised Hy 3	PC - 02 Storage Tanks 5	PC - 04 Relief System <mark>4</mark>		<u> </u>	503
Control	SS - 01 Emergency Sh	SS - 02 Depressuriazat 11	SS - 03 Gas Detection	Events on the p	- Peb 24 Dlant Event Description	Status
	IP - 01 Ignition	SS - 04 Fire	0	CR123456 N65893 CR125489	Event 1 Event 2	
	Source Control	Detection 5		CR235982 CR245896	Event 4 Event 5	
				N69872 N68957 CR135479	Event 6 Event 7 Event 8	
Mitigation	PS - 01 Fire Fighting System	PS - 02 PA, Alarm and eme	PS - 03 Passive Fire Protection	N59875	Event 9	
	15	12	14	CR145789	Event 11	INFO
Emergency	ER - 01 Escape	ER - 02 Rescue	ER - 06	CR145703 CR124687	Event 12 Event 13	
Response	and Evacuation	and Safety Equ	Emergency Po	N56789	Event 14 Event 15	
				N54987	Event 16	INFO

SAP Barrier monitoring dashboard 👻

Risk Score	Per I	Performace Standard Aff	ected Barrier Functions	Score Chang	ge Trend Over Time		Cumulative Score
Prevention	PC - 01 Pressurised Hy 3	PC - 02 Storage Tanks 5	PC - 04 Relief System 4	NN NN 0 Jan 20	021	Feb 2021	205
Control	SS - 01 Emergency Sh	SS - 02 Depressuriazat	SS - 03 Gas Detection	Work Permit	s on the plant		
	6	11	8	Object	Resource	Type of work in WP	Status
0 11		U	WP12658	Person	High voltage work	INFO	
				WP12658	Person	High voltage work	INFO
	IP - 01 Ignition	SS - 04 Fire		WP12658	Person	High voltage work	INFO
	Source control	Detection		WP12658	Person	High voltage work	INFO
	10	5		WP12658	Person	High voltage work	INFO
		0		WP12658	Person	High voltage work	INFO
				WP12658	Person	High voltage work	INFO
Mitigation	PS - 01 Fire Fighting System	PS - 02 PA, Alarm and eme	PS - 03 Passive Fire Protection	Incidents on	the plant		
	15	12	14	Event	Event Description		Status
10 12			N126547	Event Description	1	INFO	
				N126547	Event Description	1	INFO
			[N126547	Event Description	1	INFO
Emergency Response	ER - 01 Escape and Evacuation	ER - 02 Rescue and Safety Equ	ER - 06 Emergency Po	N126547	Event Description	1	INFO
	-	10	1.4	N126547	Event Description	1	INFO
	5	12	14	N126547	Event Description	1	INFO
				N126547	Event Description	1	INFO

LEVEL 3 : Barrier Level

Level 3 shows detailed information about events that affected barrier heath. From this window, it is possible to go directly to your SAP EAM window for more information about the event.

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List (2)			\$	
Object	Object type	Object Number	Object Description	Object score
Notification	Ml	000010000190	Pump motor temperature above 80 *C	2.0000
Notification	M3	000010000221	Found missing bolts near pump	(0.5000)

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	hange PM Notification: Maintenance Request		Q
Display object Pu	in process Postpone Complete Partners Partner More \checkmark		đ
Notification:	10000190 M1 Pump motor temperature above 80 *C		
Notific. Status:	OSNO		
Order:			
Notification Refer	ence object Malfunction, breakdown Location data Scheduling overview Items	Tasks	>
Reference Object			
Functional loc.:	KL.FL.E.003.FLA-03-A PUMP P-801B ASSEMBLY, FIRE WATER	8	
Equipment:		t.	
Assembly:		i	
Subject			
Coding:		i	
Description:	Test Location E		

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