WHY SHOULD YOU INVEST IN ASSET MANAGEMENT? A FIRE AND GAS USE CASE

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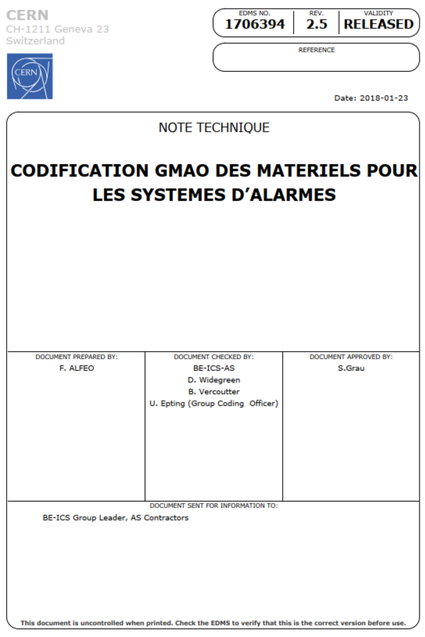
WEMPR004

Data Restructuring

Over the last 30 years, the CERN fire and gas detection asset responsible and maintenance contractors have changed many times. This led to many variations in the quantity and quality of the data entered. This does not mean that assets were missing and not maintained but it was very much focused on the core functionalities of maintenance and equipment records. In order to restructure the data in the EAM (Enterprise management system), it was decided to follow a strict process where everything was formalised and approved in a reference document before any changes could take place in the operational system.



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NOTE TECHNIQUE

CODIFICATION GMAO DES MATERIELS POUR LES SYSTEMES D'ALARMES

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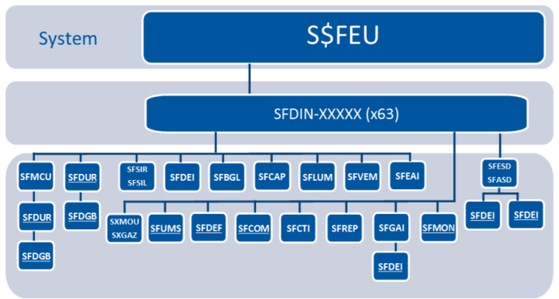
The document is divided into five main chapters

- Systems
- Assets Codes
- Classes and Categories
- Hierarchies
- Attributes



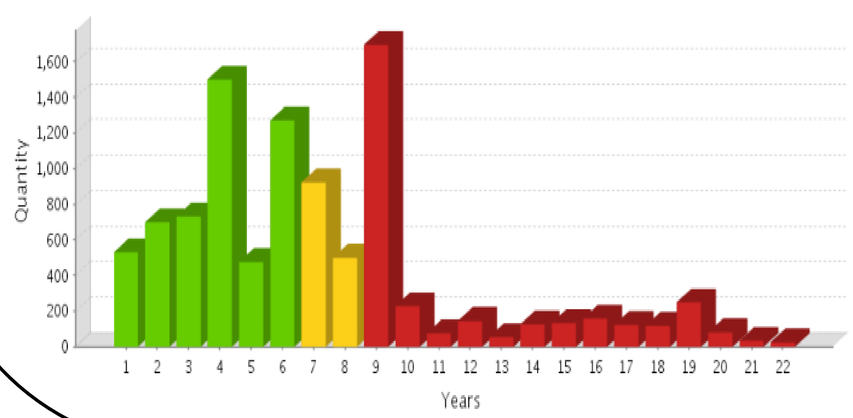
1 - PROBLEM CODE DESCRIPTION	1 - PROBLEM CODE	1 - PROBLEM CODE EQUIPMENT CLASSES
Défaut d'isolement	SP001	SFDLI/SFDPO/SFDAS/SFDDB/SFCDI/SDUR/SDGB/SFMLT/ SFMLE/SFEAI/SFMO/SREL/SMLU/SCBG/SCAP/SCIA/ SVEM/SCOM/SFSRV/SFCTI/SCRE/SFMOU/SFGAZ/SFBOI/SCOM
Défaut batteries	SP002	
Défaut chargeur de batteries	SP003	
Coupure alimentation électrique	SP004	
Défaut composant centrale (Carte, BG, Sirene, Flash...)	SP005	
Déclenchement organe de protection	SP006	
Alarme sur détection réelle motivée par Fumée/Chaleur/Evac/Gaz/Explosion	SP007	SEREV/SRMO/SCBG/SCIA/SECTI/SCRE/SMIL/SBLP/SCOF
Défaut détecteur	SP008	
Défaut pompe	SP009	
Prealarme gaz determinée (sauf détection réelle)	SP010	SFMOU/SFGAZ/SXSPR
Alarme gaz determinée (sauf détection réelle)	SP011	
Alarme feu determinée (sauf détection réelle)	SP012	
Alarme evac determinée (sauf détection réelle)	SP013	SGCDG/SGDEX/SGDOX/SGDTX/SCLE/SGCPO/SCBG/SGCAT/ SGCIR/SGCEC/SDGB/SDUR/SCIA/SREL/SRLU/ SCRE/SCON/SGDGP/SGNET/SGBAL/SCOL
Defaut surveillance debit aspiration	SP014	
Defaut ligne ou boucle de detection	SP015	
Suite intervention non finalisee astreinte	SP016	
Autres	SP017	SCSP/SSTIR/SSMOD/SSMOS/SPPC/SWST/ SPOW/SFDAS/SSDEX/SSDTX/SSDOX
Prealarme gaz non determinée	SP018	
Alarme gaz non determinée	SP019	
Alarme feu non determinée	SP020	
Alarme evac non determinée	SP021	

SFDEI général Safety – Feu – DEtecteur Incendie

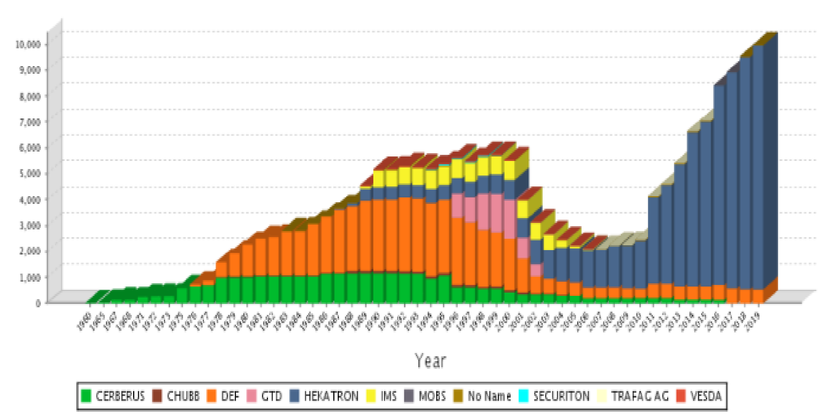
Class		Catégories		Manufacturer
SFDLI	Détecteur LInéaires	SF-FIRERAY	Faisceau	HEKA
		SF-ARDEA		
		SF-ARDEA-BOOMRANG		
		SF-FORAV		DEF
		SF-SOLAR		
SFDPO	Détecteur POnctuel	SF-ADX156	Détecteur Extinction Friteuse	HEKA
		SF-MCD573MC	Détecteur Ponctuel Coloré	
		SF-ORM130EX-1	Détecteur Ponctuel de Fumée ATEX	
		SF-MMD130EX-1	Détecteur Ponctuel de Fumée ATEX	
		SF-MCD573	Détecteur Ponctuel de Fumée ou de Chaleur	
		SF-MMD140		
		SF-MCD573X		
		SF-FRM	Détecteur Wi-Fi provisoire	MOBS
		SF-R970	Détecteur Ponctuel de Fumée	SIEM
		SF-D01151		DEF
		SF-ORION		
		SF-VOA		HEKA
		SF-ORM130-A		
		SF-ORM140		
		SF-SCD573		

Once the necessary data of the right quality is available in the EAM, it becomes much easier to extract information that is critical for the asset owner and the management.
Reports showing the age distribution in classes of equipment are now possible, as well as the evolution of the equipment park over time. Both are essential to predict the replacement and maintenance cost for the coming years.
A deciding factor that motivated the work of restructuring and completing the data in EAM was the request to produce a PPE (Property, Plant and Equipment) report in order for the accounting services to take the value of the CERN installations into account

Age distribution report



Equipment evolution report

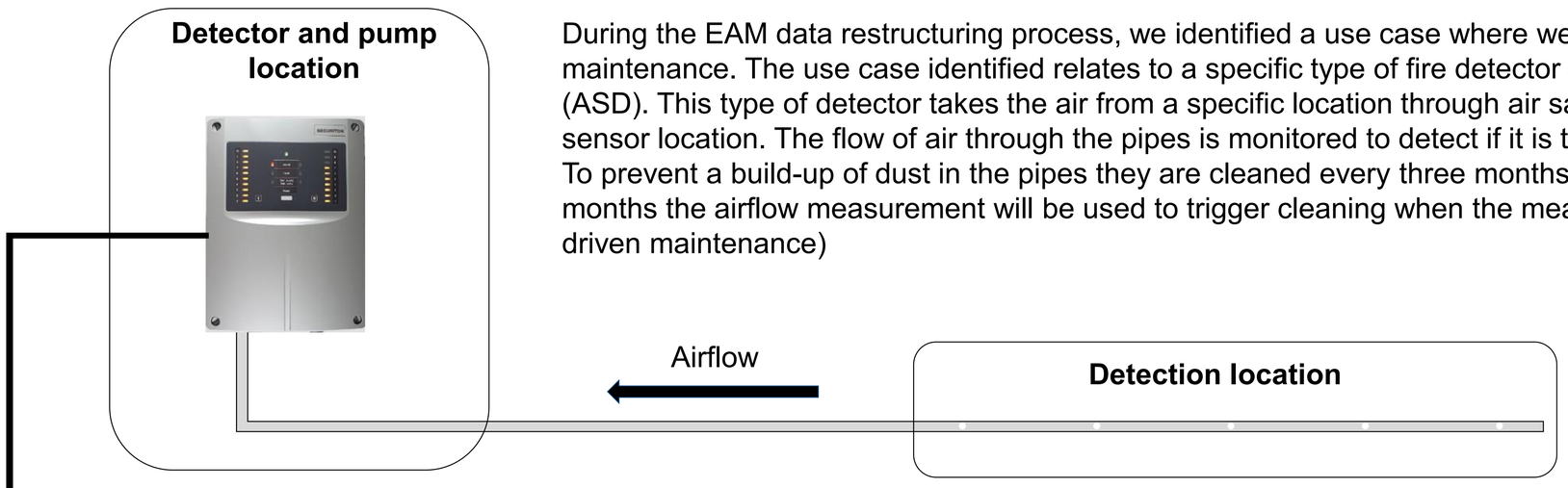


PPE (Property, Plant and Equipment) report

	Class		
	Class Description		
	SCBG Bris de Glace	SCIA Indicateur d Action	SDGB jeux de Batteries
Year	Equipment Commissioned	Equipment Commissioned	Equipment Commissioned
1995	-	-	-
1996	57	-	1
1997	8	-	-
1998	60	-	1
1999	13	-	-
2000	271	-	-
2001	111	-	-
2002	75	25	-
2003	51	10	-
2004	177	-	-
2005	496	65	-
2006	33	81	-
2007	51	122	-
2008	57	143	-
2009	31	140	2
2010	18	78	5
2011	63	16	1
2012	45	11	5
2013	35	23	4
2014	189	68	11
2015	49	13	37
2016	48	5	134
2017	98	35	64
2018	126	57	92
2019	11	8	74
Grand Total	2,173	900	431

Data-Driven Maintenance

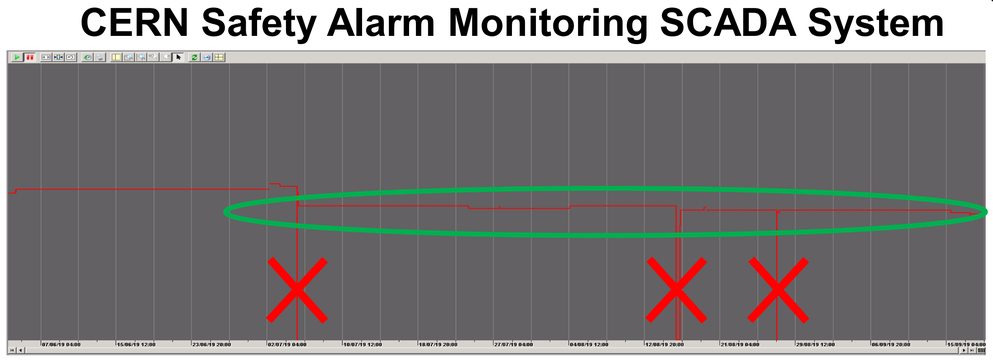
Data-driven maintenance has long been seen as a way of optimising the maintenance cost and increasing system availability while maintaining the reliability of the installation. Research by IBM found that 89 percent of asset failures occur at random, and those are difficult to prevent with planned maintenance. In order to do data-driven maintenance sufficient data must be available for the decision making. Often this data is only available on the automation / SCADA system and not shared with the maintenance system.



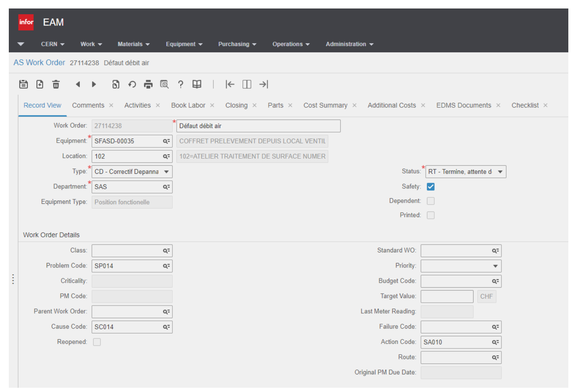
During the EAM data restructuring process, we identified a use case where we could try to implement data-driven maintenance. The use case identified relates to a specific type of fire detector called an Air Sampling smoke Detector (ASD). This type of detector takes the air from a specific location through air sampling pipes and transports it to the smoke sensor location. The flow of air through the pipes is monitored to detect if it is too high or too low.
To prevent a build-up of dust in the pipes they are cleaned every three months. Instead of cleaning all the pipes every 3 months the airflow measurement will be used to trigger cleaning when the measurement approaches the lower limit (Data-driven maintenance)

The goal of the automatic solution is that the system will learn over time what constitutes a condition that requires the pipes to be cleaned. Sudden peaks in the measurements should be ignored as they can be caused by maintenance or ventilation changes.

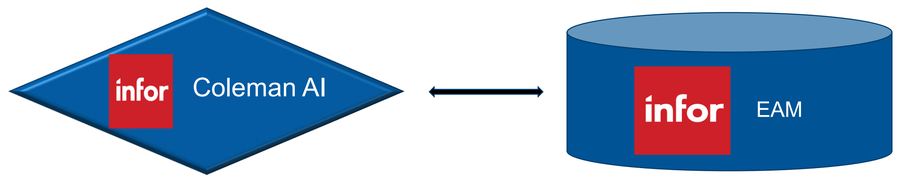
CERN Safety Alarm Monitoring SCADA System



Work order for tube cleaning



Together with our EAM provider, INFOR and the central asset management service at CERN a solution is being developed based on an AI (Artificial intelligence) module that will automatically generate work orders based on measurements and limits



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