



**excellence in** *Dependable Automation*

# SILStat

Operation & Maintenance Data Collection with SILStat™



[www.exida.com](http://www.exida.com)

# Maximizing Risk Reduction through Collection and Analysis of Operation & Maintenance Data.

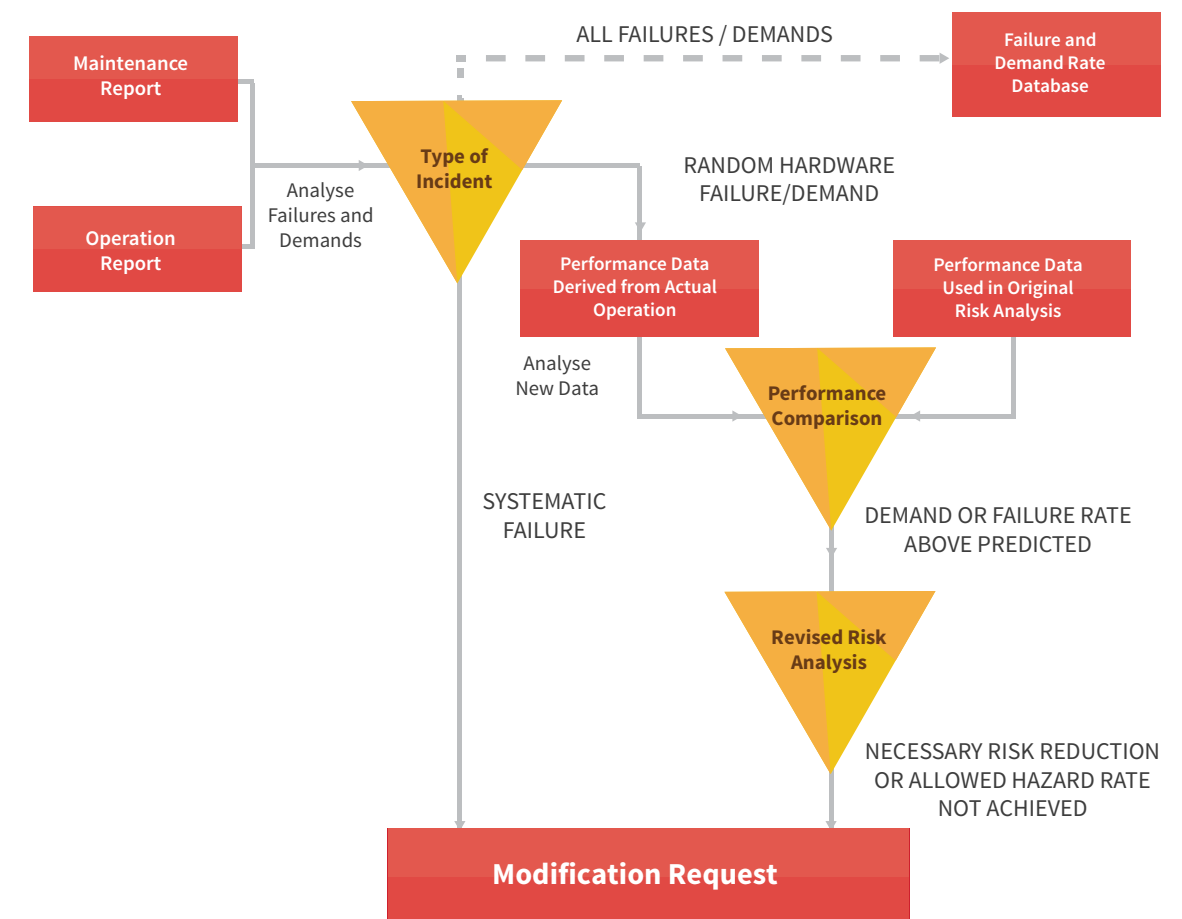
## What is SILStat™?

SILStat captures key operational and maintenance data (such as equipment failures, process demands, success or failure of protection layers, proof test results, execution of mandatory maintenance activities, etc.,) for review and analysis as required by the IEC 61511 / ISA 84.00.01-2004 standard and as part of compliance with an OSHA Process Safety Management (PSM) Mechanical Integrity Program.

The IEC 61511 / ISA 84.00.01-2004 functional safety lifecycle consists of three main phases:

- » Analysis
- » Realization
- » Operation & Maintenance

When optimizing the risk reduction of **safety instrumented functions** and other layers of protection, it is necessary to collect actual performance data so that it can be compared to the expected performance (determined during the Analysis and Realization phases). Operation and Maintenance data (such as demands and failures) can be used to determine the actual risk posed by a hazard scenario and the effectiveness of the individual layers of protection. Comparing actual (achieved) risk reduction vs. expected risk reduction allows safety practitioners to evaluate the effectiveness of their risk reduction design and take appropriate action.



Requirements for Operational Safety Data Analysis and Review [IEC 61508]

# Data Collection

SILStat supports the capture, documentation, and classification of the following “life events” in a format that is compatible with the Center for Chemical Process Safety (CCPS) Process Equipment Reliability (PERD) database level 2.

	Demands
	Proof Test Results
	Maintenance activities (scheduled)
	Maintenance events (ad hoc)
	Failures

New life events can be recorded in the SILStat event database for a specific device or address location in a plant. Events can originate from an engineering workstation or from a mobile recorder application. It is possible, for example, to document the results of a process demand, including what hazardous situation occurred and the effectiveness of each associated layer of protection (which layers worked and which layer(s) failed). The event database can also record auxiliary information such as the SAP Work Order Number, which authorized and scheduled a maintenance activity like a proof test.

The SILStat dashboard provides a simple overview of upcoming proof tests and activities. Recorded events can be reviewed and analyzed through the SILStat event viewer, which provides powerful sorting and filtering capability to identify performance trends. The recorded events are used to calculate actual demand rates (initiating frequency), failure rates, and probability of failure on demand (PFD) for devices and layers of protection.

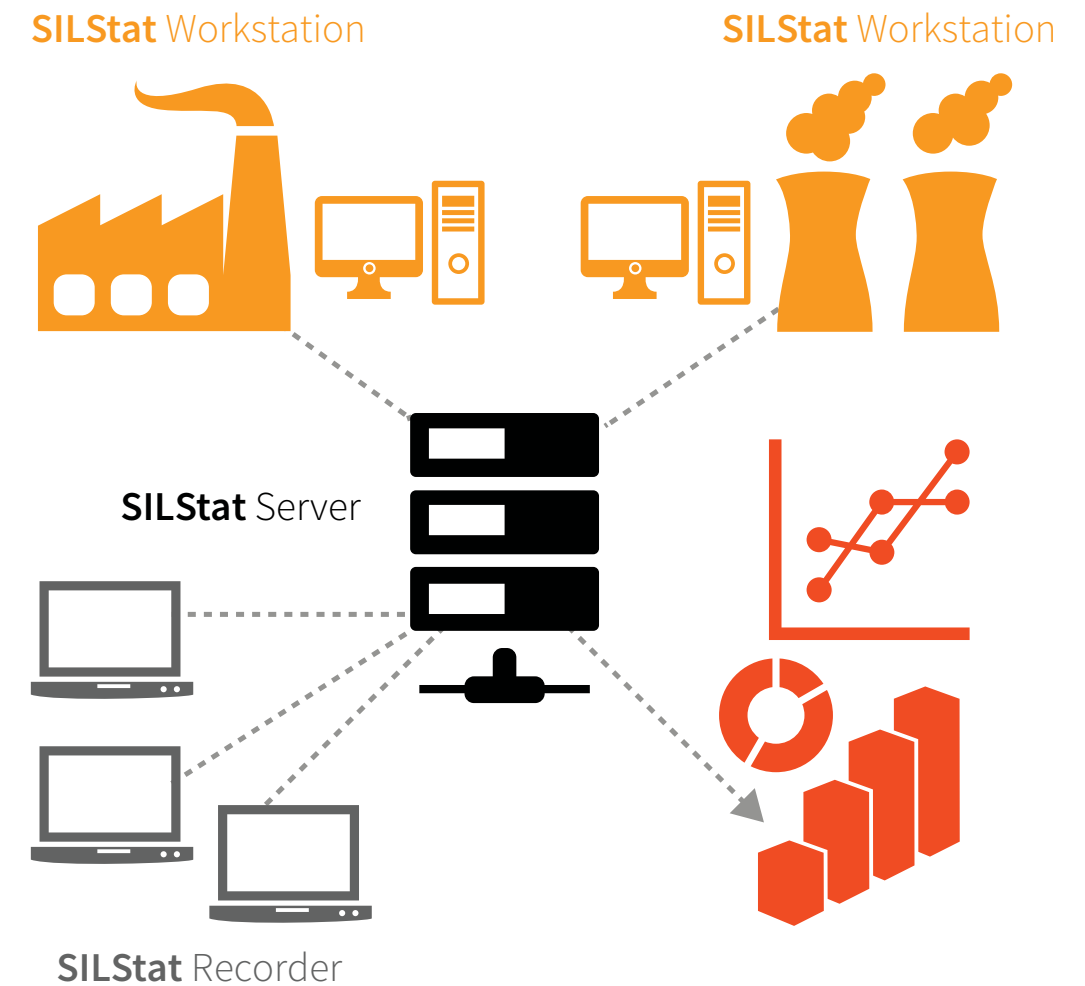


SILStat Dashboard

# Data Evaluation

Capturing operation and maintenance data (events) for plant equipment provides the ability to evaluate the achieved risk reduction achieved.

Level of Actual Risk Reduction Provided		Actions
	Protection is adequate	Continue data collection
	Protection is inadequate	Process hazard risk is higher than expected or SIF is under designed to protect against the process hazard. return to Analysis phase for redesign and implementation.
	Protection is more than adequate	SIF is over-designed to protect against the process hazard or process hazard risk is lower than expected. Allows modification of design practices for future applications and potential for cost savings.



# Proof Tests and Mandatory Maintenance Activities

## Efficiently run your Proof Test Program

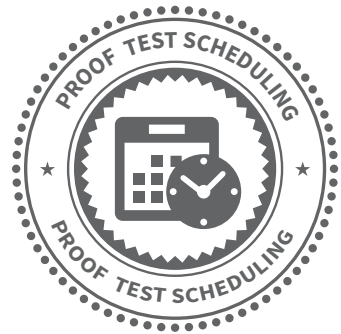
A key activity during operation and maintenance is the execution of proof tests periodically based on design performance requirements such as the expected level of risk reduction.

When it comes to safety instrumented functions, the higher the safety integrity level (SIL) the more frequent, rigorous, and costly the proof test. SILStat provides the following capabilities to improve the effectiveness of the plant's proof test program and minimize cost:



### Proof test procedure generator

Create templates for organizing and reusing proof tests. Export the proof tests created by the conceptual design engineer in exSILentia® during the up-front design of the risk reduction scheme. Customize these procedures as necessary (e.g., add measurable pass / fail criteria) for execution by maintenance personnel. Use version control to organize proof test documents and manage changes to them.



### Proof test scheduling

SILStat provides the ability to schedule proof tests. The software will provide an overview of proof tests due, overdue and the overall compliance status for each SIF identified in the software. The scheduling allows for tracking of proof tests and demonstrating standard compliance to regulatory inspectors.



### Proof test recording

Ability for operation and maintenance personnel to view and execute proof tests. The user follows the proof test procedure (checklist) defined for a specific address location in a plant and records factual data. For SILStat Site applications this can be done remotely using a SILStat Recorder. All recorded data and observations are stored in the SILStat database.



### Review / Evaluate Results

Proof test results are automatically reviewed and evaluated. SILStat compares the collected factual proof test data to the pre-defined pass/fail criteria that was defined in the proof test procedure. Additional comments can be added to the test results and maintenance events can be scheduled (e.g., device requires repair and replacement).

# Execute Mandatory Maintenance Activities

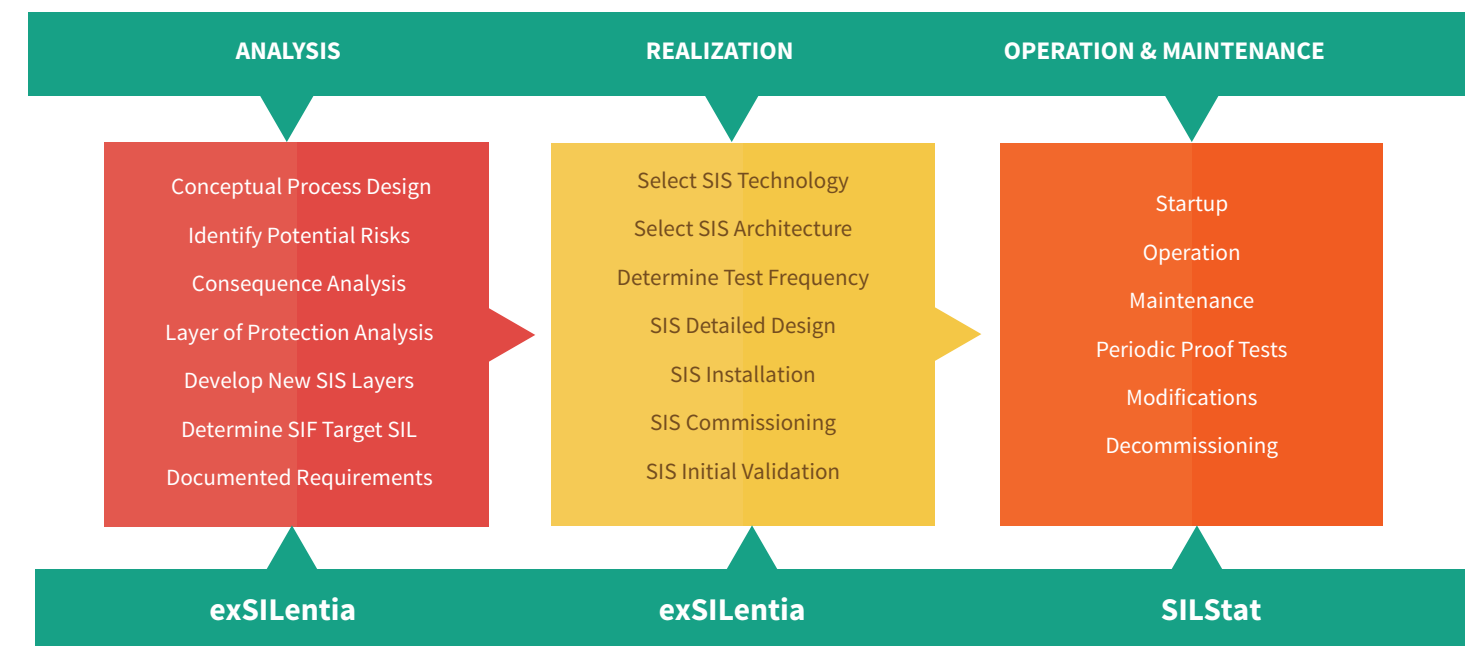
Manufacturers define Mandatory Maintenance Activities for their products. These activities could include replacement of expiring sensing elements, replacement of products at the end of useful life, periodic cleaning of impulse lines, etc. The execution of these activities is essential to continue to be able to claim compliance to the conceptual design.

SILStat allows the scheduling of these activities, including definition of multi-step tasks, similarly as proof tests.

## SILStat Position in the PSM/Functional Safety Lifecycle

SILStat supports the operation and maintenance phases of the PSM and Functional Safety Lifecycles. As such it is intended to be used for many years to allow life event data collection. This is in contrast to the tasks that are executed during the Analysis and Realization phases of the PSM and Functional safety lifecycle which are typically executed in a much shorter time frame as part of dedicated projects, e.g. re-evaluation of the SIS installed as part of the mandatory PHA review cycles.

# SAFETY LIFECYCLE



exida end-user software position in the PSM and Functional Safety Lifecycle

## Minimize Configuration Time by Reusing exSILentia® Design Documentation

Much of the required SILStat configuration can be built automatically from the design documentation developed as part of the Analysis and Realization phases through a simple import of an exida exSILentia project file. This not only reduces application setup time cost, but also improves traceability between safety system design and operation & maintenance. SILStat has two main interfaces for engineering and configuration of the database.



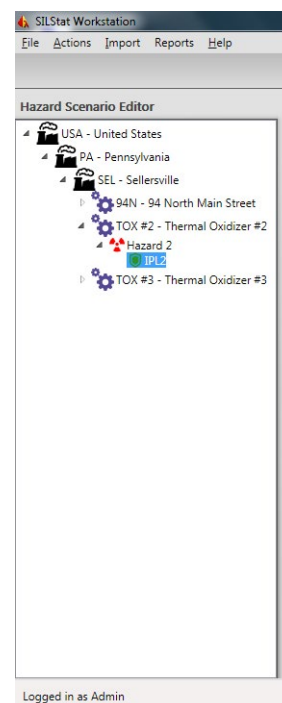
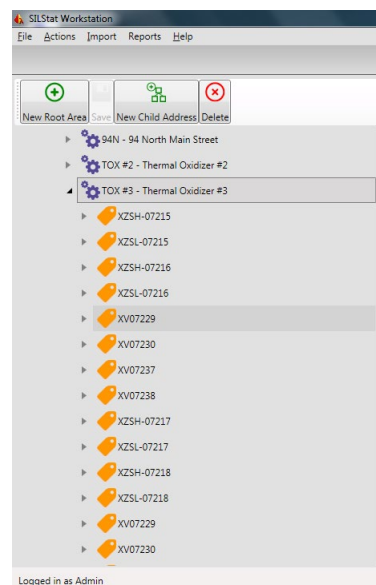
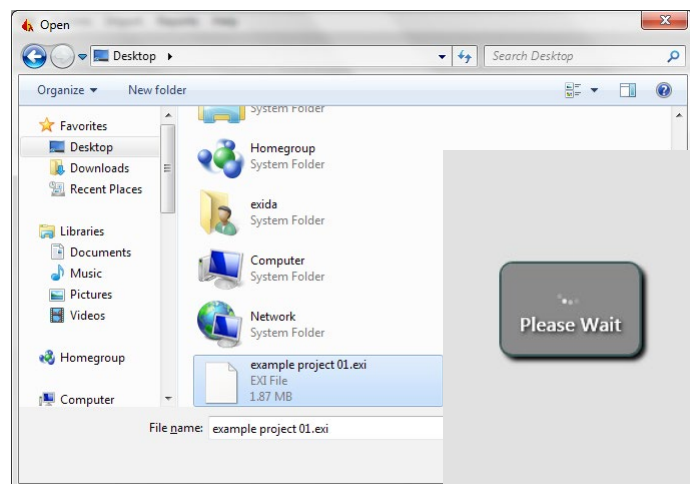
### Plant Hierarchy

Represent the actual plant equipment layout by unit / equipment / device / component. Definition of safety instrumented functions including (tag / addresses) can be created manually or automatically from the results of SIL Verification documented in exSILentia's SILver™ tool. Definition of non-SIS protection layers (such as alarms and relief valves) can be created manually or automatically from SIL target selection results documented in exSILentia's SILect™ tool.



### Hazard Scenario Editor

Presents each defined hazard scenario with its associated layers of protection. Layers of protection are shown in order of activation (which one should trigger first, second, etc.). Hazard definitions can be created manually or automatically from SIL target selection results documented in exSILentia's SILect tool.



Importing exSILentia data into SILStat

## SILStat Licensing Options

SILStat is available in two different options: SILStat™ Lite and SILStat™ Site.

### SILStat™ Lite

SILStat Lite is a single user, standalone application which will allow the user to introduce the concepts of life event recording within their organization. The SILStat Lite application provides a single event repository, with single administrator and recorder interface. All event data recorded are easily transferable to a SILStat Site installation if the user decides to extend the use of SILStat within their organization.

### SILStat™ Site

SILStat Site provides a multi user environment with a central server based event repository. SILStat Site provides a flexible system architecture which supports effective use by engineering, operations, and maintenance personnel. SILStat Site is designed to support applications ranging in scope from a single site up to the enterprise. It consists of three main components:



#### SILStat Server

Common repository for proof test procedures, failure and demand data, and proof testing results which can be accessed by multiple users.



#### SILStat Workstation

PC based system that contains the tools for configuration of the plant hierarchy, hazard scenarios, and proof test procedures as well as for administration. Workstation can also be used for the documentation of failures, demands, and events.



#### SILStat Recorder

Mobile application running on a handheld or tablet that can be used to execute proof tests, record proof test results, as well as document failures, demands, and events. It allows plant documentation (Wiring schematic, P&IDs, etc.) to be accessed remotely.

**SILSTAT**

**For more information or to request a quote:**

Contact your local exida representative

**or visit our website at:**

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