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The High Cost of Paper Relief and Flare System Documentation

Paper in a paperless world

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Preamble

"It should not be necessary for each generation to rediscover the principles of process safety which the generation before discovered. We must learn from the experience of others rather than learn the hard way. We must pass on to the next generation a record of what we have learned."

- Jesse C. Ducommun
Safety Pioneer

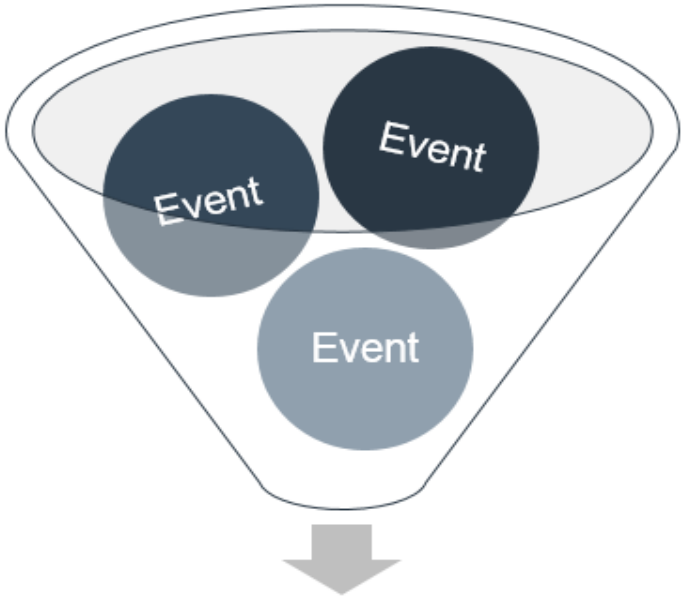
Quoted from the Report of the BP U.S. Refineries Independent Safety Review Panel

We are as fast as our slowest parts

Relief Systems – The last line of defense

Are we safe to operate?

upstream, midstream or downstream



Relief & Flare Design Documentation

How much feed rate can we increase?

What if we push x% more feed?

Can our operations handle it?

What modifications do we need to make?

Can we handle more gas from the well as compared to oil for which our upstream facility was designed for?

Internal or External Audits

Atmospheric Tie-ins- Compliance, Environmental Maintenance, Turnaround cases

Ownership Changes

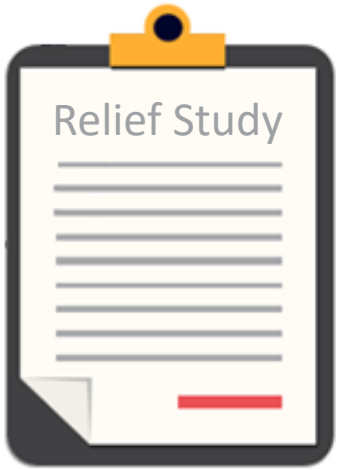
What do you need for Relief Studies

Design Unit Basis

Limiting Equipment Data

Stream Properties

Relief Device Information and Capacities



System Definition & Equipment Info.

Overpressure Contingencies & Relief Rates

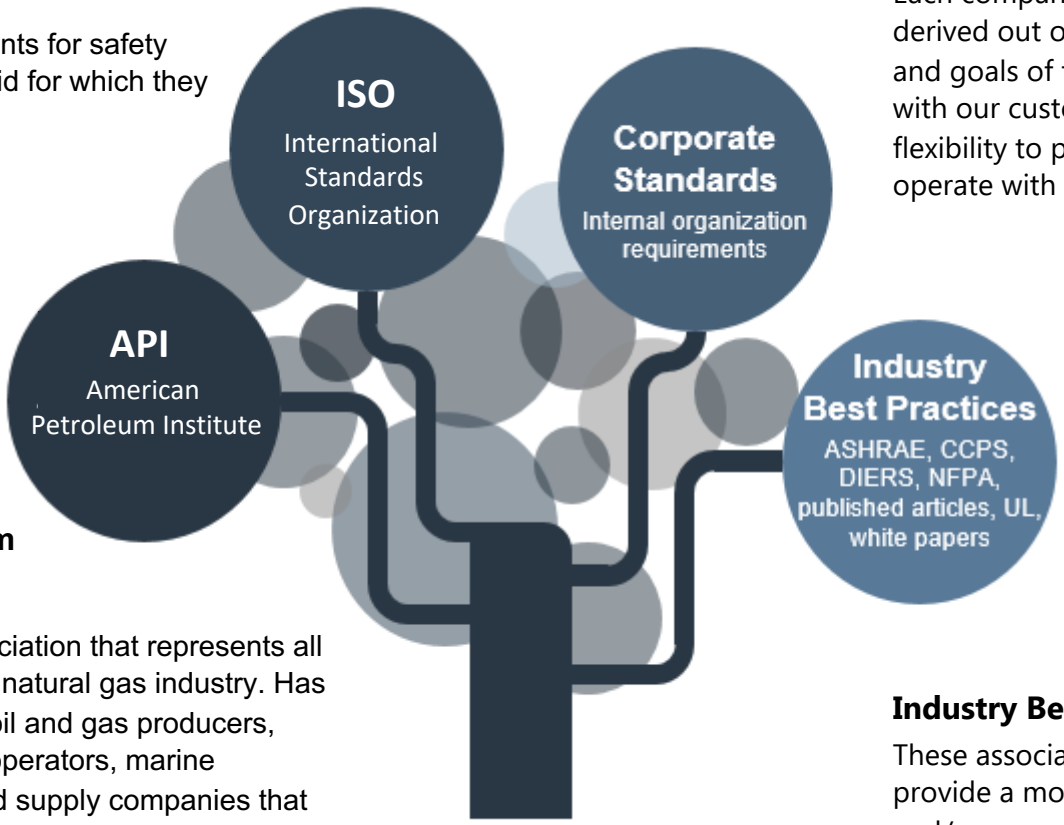
Formulas & Calculations

Reports and Documentation

Process Safety Information (PSI)

(ISO) International Standards Organization

Specifies general requirements for safety valves irrespective of the fluid for which they are designed.



Corporate Standards

Each company has its own internal standards derived out of the history of their operation and goals of the organization. Salus works with our customers to provide them the flexibility to perform the work needed to operate with in these requirements..

(API) American Petroleum Institute

The only national trade association that represents all aspects of America's oil and natural gas industry. Has 600 members consisting of oil and gas producers, refiners, suppliers, pipeline operators, marine transporters, and service and supply companies that support all segments of the industry.

Industry Best Practices

These associations and/or sources provide a more detailed instructions and/or case studies supplementing the API and/or ASME standards.

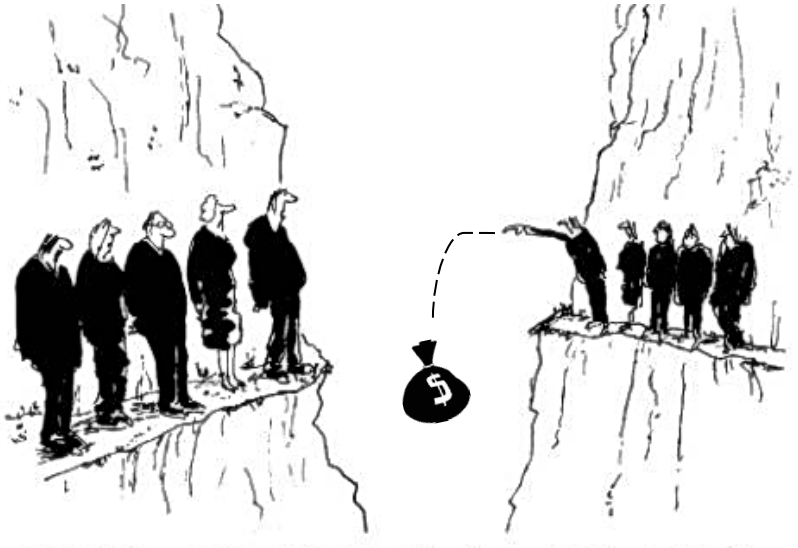
What is the end result?

Paper Reports or .PDFs

- Data can get scattered across different departments, systems, employee desks
- Different owners across the operating facility for different PSI
- Multiple PSI Systems
- Project based documentation

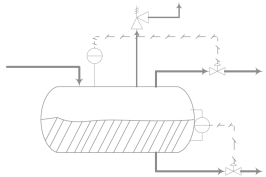
Gaps In Communication

Communication gaps and inconsistent analysis between various contractors resulting in expensive reworks for operators.

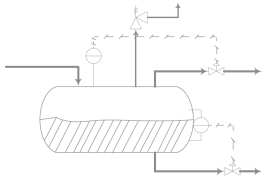


Data Fragmentation

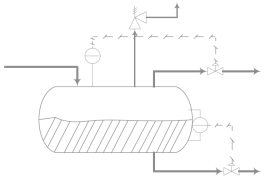
Equipment and Relief Device Data



Data can quickly become out of sync with each other and relies on strong communication between business segments.



Change "A"



Change "B"

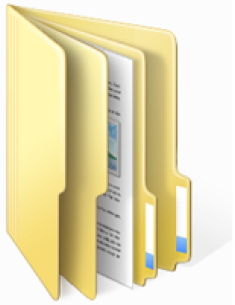
There has been progress

Implementation of Technology

Faster Simulations

Faster Hand Calcs

Digital Paper



Digital File Cabinet

- Traditional work made faster
- Still Siloed
- Collaboration Limited
- Work is duplicated
- Deliverables still fragmented

The faster we get the more expensive the delay

The Impact…

Up to

80%

Rework

Seen for relief valves on a new facility design (specially if the EPC is not familiar with codes & standards).

Full or majority revalidation of relief systems

- Decisions made with incomplete data
- Missed opportunities
  - Safely increase rates
  - Alternate modes of operation
  - Effective debottlenecking
- Installation of relief valves or equipment not needed
- Failure to understand the impact of a change.
- Corporate or Site standards not consistent.

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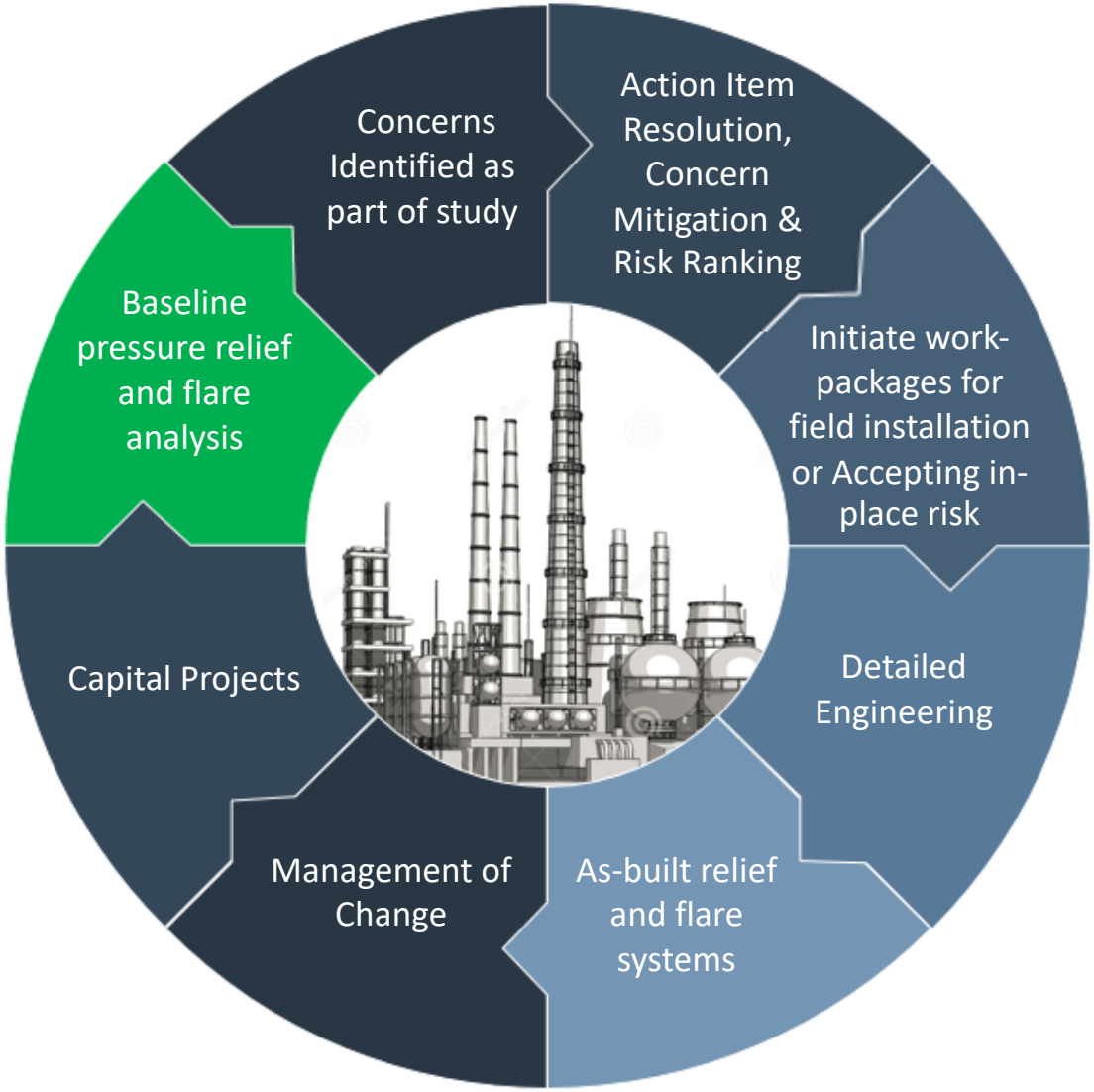
Salus & Symmetry

Build an Ecosystem

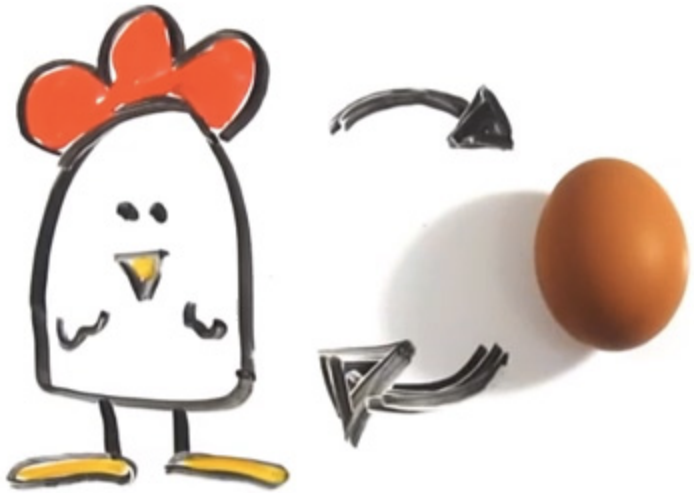
- Data consistency between Relief Systems and Flare models
- Consistency between design and as-built revisions for flare and relief systems.
- Provide flare data mining across multiple versions
- Provide reporting capabilities using the results and inputs of flare runs.
- Availability of working, approved, and as-built models in one place.

An Evergreen Solution



Affects of Change

Site Operations



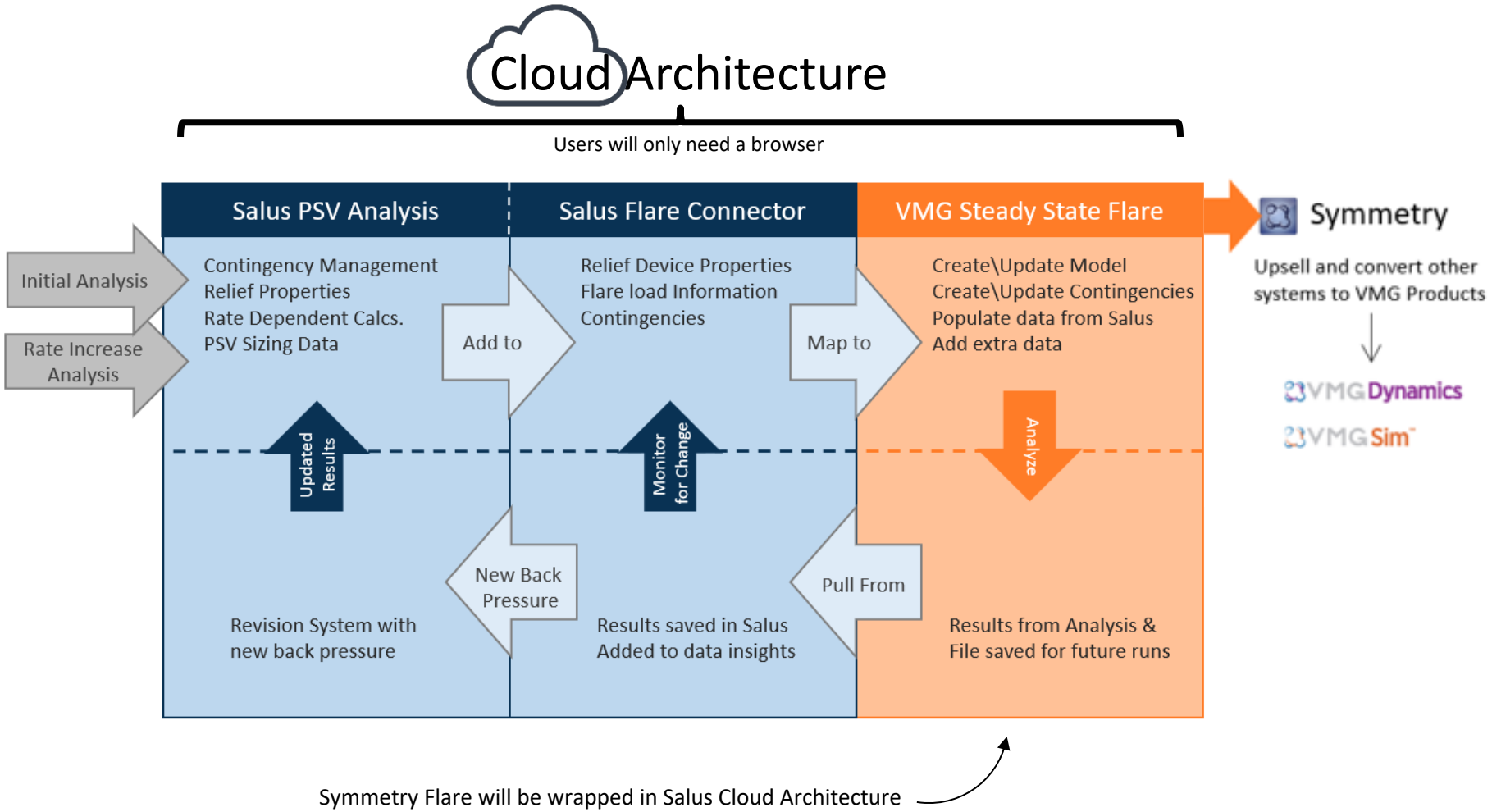
Mechanical Changes

Mitigation Changes

Relief and Flare Analysis

Flare Connection

A evergreen ecosystem for relief and flare analysis



Data Insights

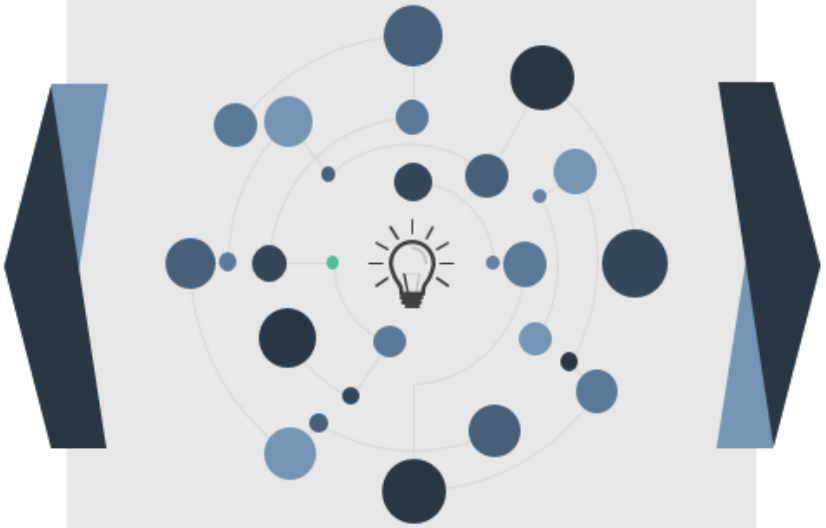
Search your data or analyze it for concerns

Read only

Findings Analysis

Search your data to identify issues with your relief systems.

- Undersized RD
- P-drop issues
- High Relief Temps
- Min Outlet Temp
- Rate Dependent



Data Mining

Browse, filter, and search your data for your business needs.

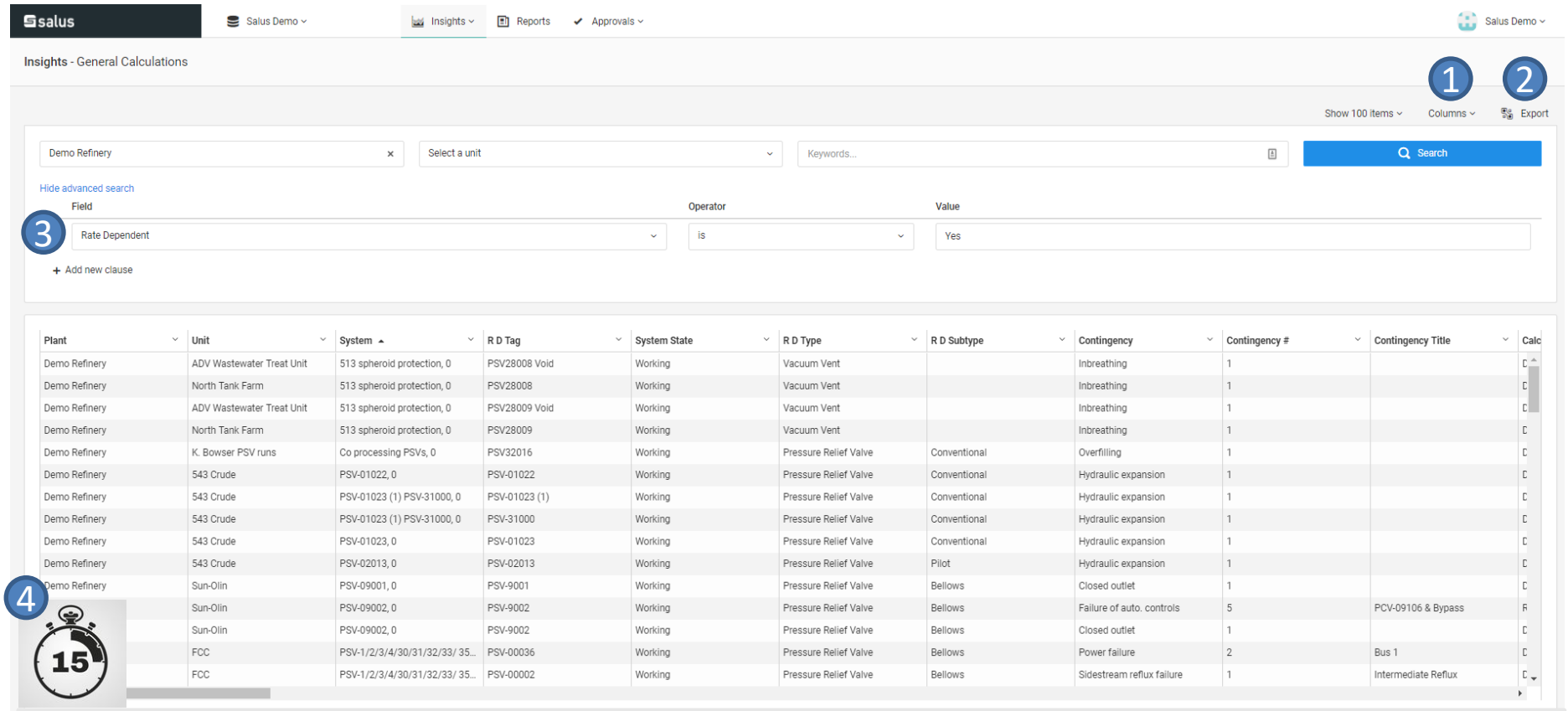
- Relief Devices
- Equipment
- Control Valves
- Systems
- Streams
- Contingencies

Relief Study Data

Get Answers Fast

Rate Dependent Calculations

Example Searches using Data Insights



1. Add more columns to your search results
2. Export any search to Excel to take advantage of Microsoft's toolset or email results
3. Perform Advanced searches to quickly refine results.
4. We provide results in 15 seconds or less

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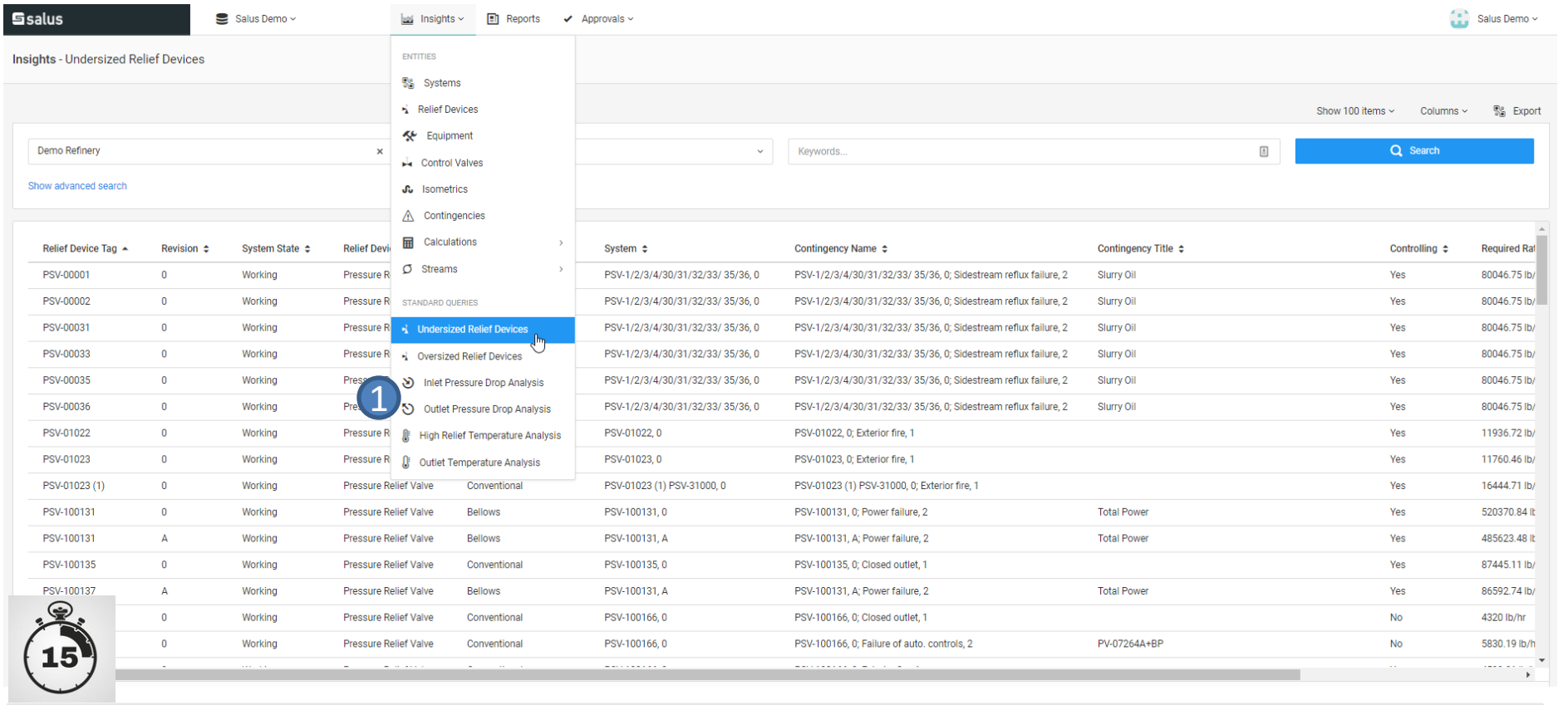
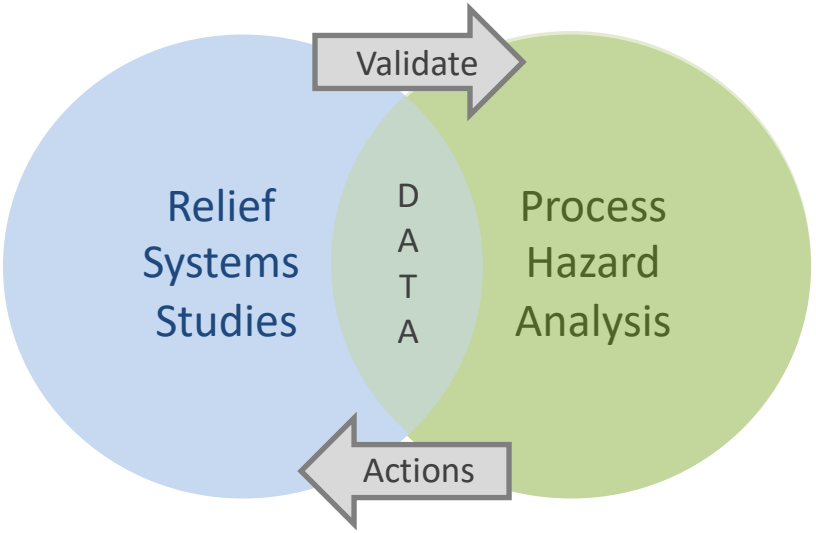
Undersized Relief Devices

Example Searches using Data Insights



1. Quickly analyze for a number of concerns using our industry standard queries.

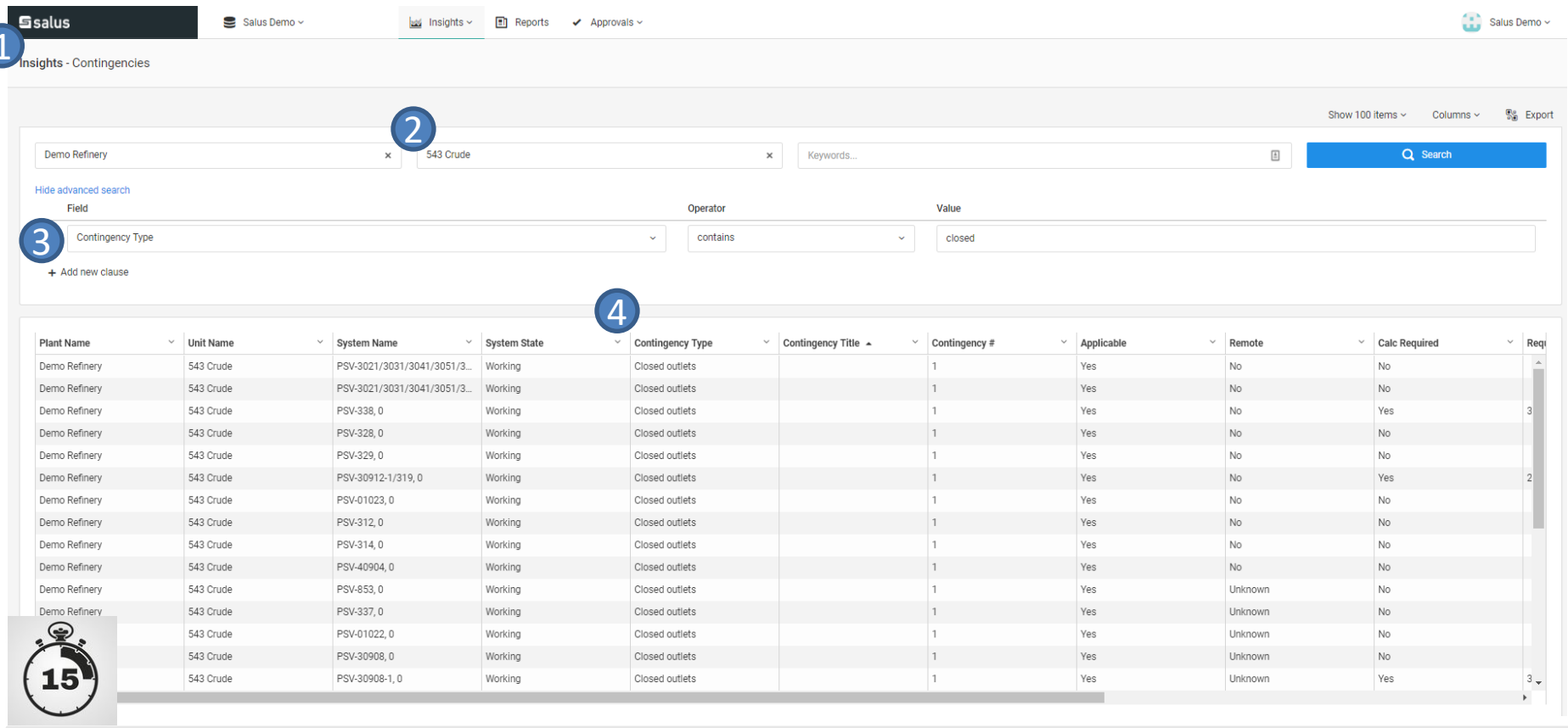
Process Hazard Analysis



- ✓ Improved quality of Analysis
- ✓ Quick answers to questions
- ✓ Action Tracking Avoidance

Prepare before the PHA

Example Searches using Data Insights



1. PHA facilitator can prepare before the PHA by searching contingencies analyzed.
2. Select the Unit being analyzed.
3. Perform an advanced search for all closed outlets.
4. Review, print, and analyze before the PHA kicks off

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A Centralized Workspace

Hosted Environment

Data Center

Servers and data reside in data facilities comply with rigorous standards set by trade groups and certifying organizations.

Cloud

Customer Access

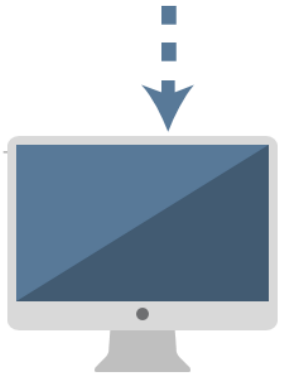
Users access Salus through their browser which allows them to use the application as though it was installed on their machine.

Unlimited Storage

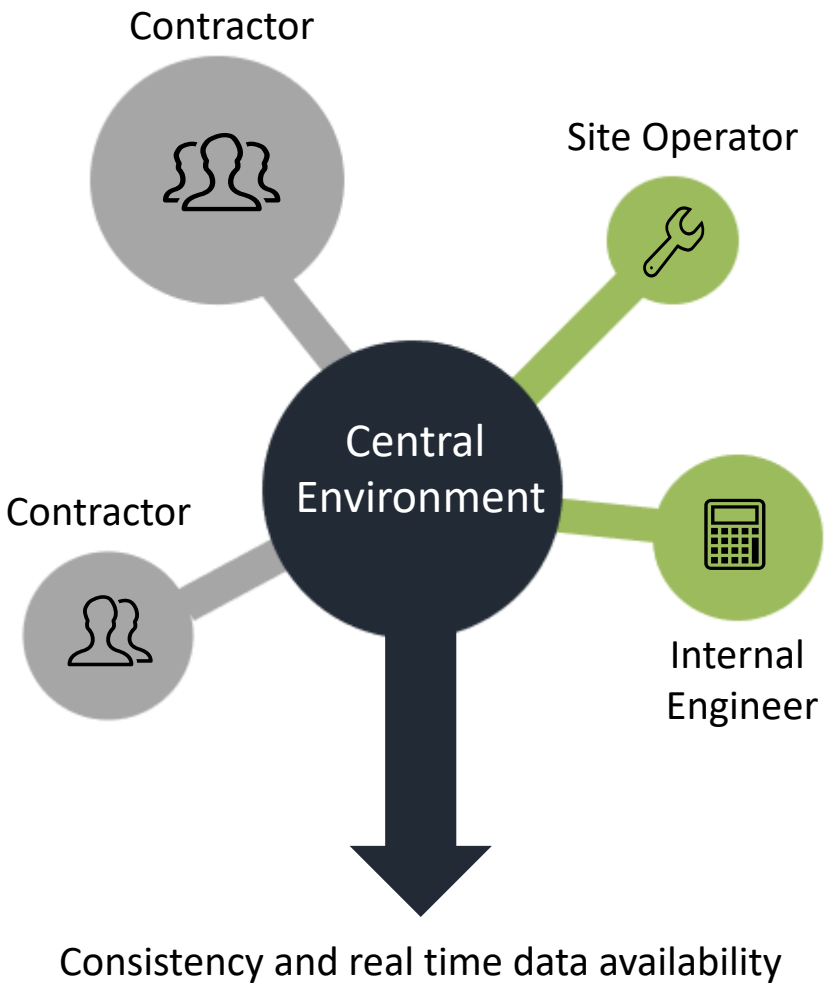
Disaster Recovery

Continuous Deployment

Customer Machines



Centralized Data Management



- Operator has full control over the centralized data set
- Consistency and standards are enforced across all parties
- Data is available for everyone to view for their specified use cases.
- Operator owns and can update the models.

Safety can be effective & affordable

Savings

60%

**See NIST_GCR_04-867 - Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry*

3-5% of the actual cost of the baseline revalidation vs revalidation every 5 years

Site savings varies from Upstream, Midstream, and downstream but is significant.

- Your data is always up to date and is available to all parties.
- Business and operations can make reliable decisions to manage change and increases at a facility.
- Impact of change identified quickly
- Standards are followed between contractors and operators
- Corporate wide data and analytics across sites can be measured
- Findings and risk rankings are better managed

What about data warehousing and digital twin initiatives?

Data Integrity

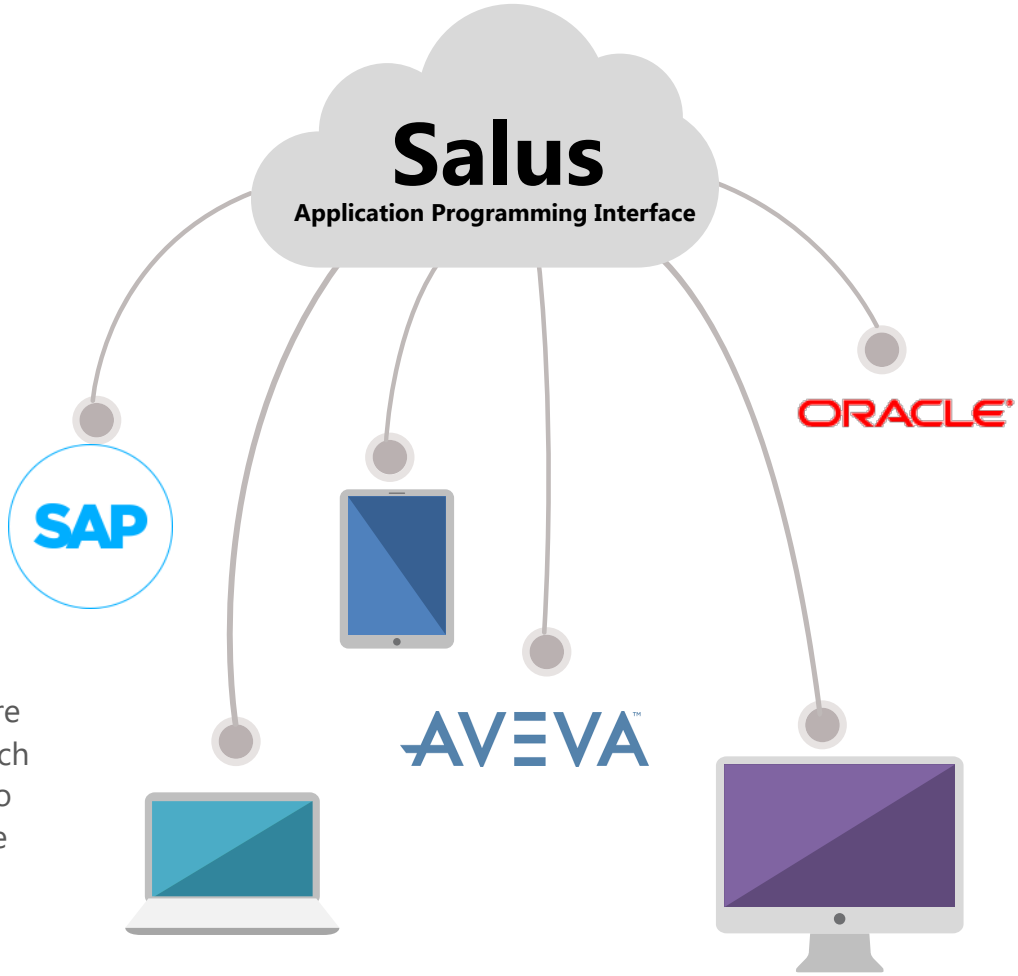
Protect against data fragmentation and duplication

A solution for data fragmentation

Corporate data is often stored in many locations which lends for double data entry and data fragmentation. An update to one does not always propogate through all the other business systems. This can lead to documentation and analysis that are missing information and can quickly become out dated.

Integration support for 3rd party software

Salus provides an working application programming interface (API) which allows for connectivity to any software that supports this kind of connection. Business systems such as SAP, Oracle, AVEVA, and other can all work with Salus to help make sure your data is updated as per your corporate workflows.



A Complete Ecosystem

- Promote cross business communication of change
- Affective view of data from any dashboard
- Automated transfer and notification of change
- Elimination of fragmented data
- Corporate wide view of information
- Consistent report generation

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Its Question Time!

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