



Risk Alive Analytics

Be seen and be **part of** changing the purpose of Safety Data forever to make the world a safer place.

Our Inspiration:

We started with challenging the “checkbox” normalcy of PHA’s, HAZOP’s, LOPA’s, SIL studies. We learned and now understand that the data in the “checkbox” exercises really represents truths of hazardous scenarios and processes from employees, operations, and designers. It is now understood that when the “checkbox data” is shared, integrated and analysed, the resulting clarity can be powerful, insightful, efficient, and safer.

Why Now?

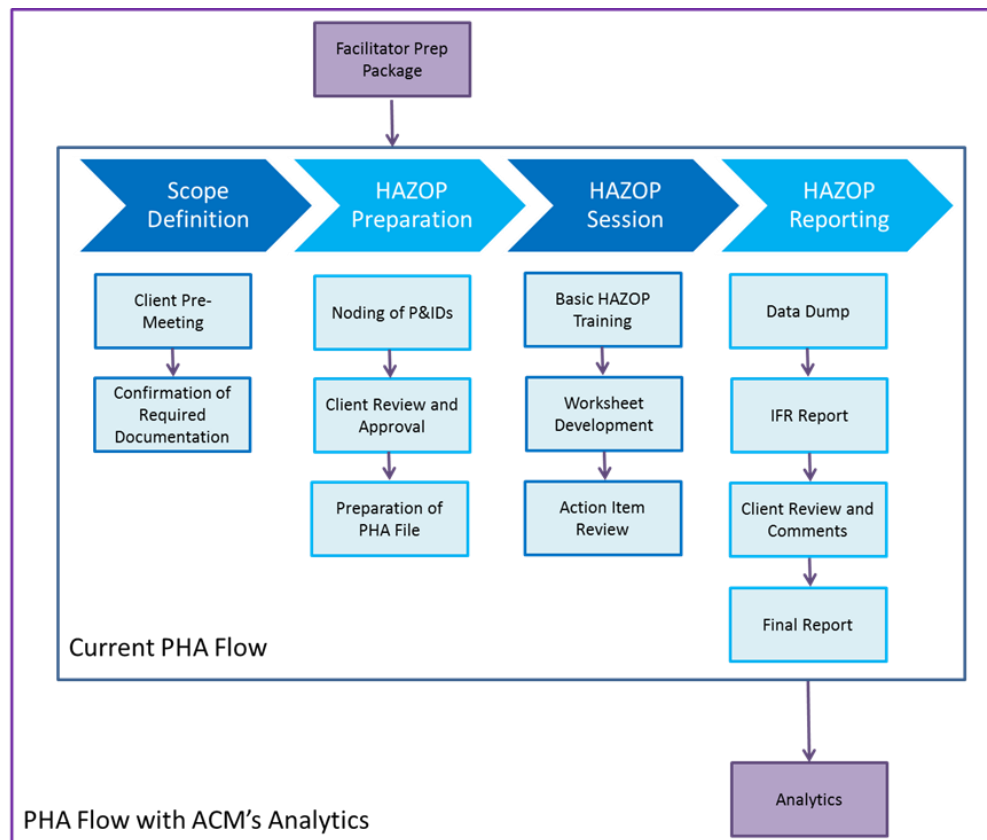
These are extraordinary times and we need to come up with new ways of proving process safety is an important investment. Our traditional business of helping others understand the process risk when building facilities, making changes was very successful in normal times. Our vision of making the world a safer place was small by most measures thinking we could do it one job at a time. I am more excited today than ever before because I believe that what we are working on over the last 18 months has changed our perspective of how to make the world a safer place. This is not by helping one owner operator a time but by helping people like you help your clients, one client at a time. Our vision of making the world a safer place can now be achieved together.

What is it?

People in our business can now learn a deeper understanding of their risk data which is likely collecting dust and not being used today; old PHA’s, HAZOP’s, LOPA’s can now be considered gold. Risk Alive Analytics is developing a Risk Prediction Model where it will be able to predict when your next unsafe day will be. Currently process plants are exposed to hazards 24/7 and surprised when incidents happen to them.

In the process of building this Risk Prediction Model we have uncovered a new and deeper understanding of old risk data sets. Risk Alive considers this data gold, from the amount of information that can be gathered from it. Risk data sets are truths heavily invested into by intelligent people and by the owners who paid for it. These data sets contain intelligent data and can be grinded out into millions of data bytes and turned into hundreds of calculations using push button technology. These calculations known as analytics can then be turned into data views, trends and even more complex analytics.

How Will it Change PHAs?



Risk Alive Analytics uses the concepts of *Big Data*. Use Risk Alive Analytics on “checkbox data” and watch what happens. The next time you conduct a PHA session it could include:

1. A prepopulated list of the most significant causes/threats, hazardous events and safeguards taken from 10 related facilities with similar chemicals and equipment as well as previous industry incidents.
2. The most critical equipment failures contributing to highest risk for this type of facility.
3. A prioritized list of recommendations based on a cumulative view of risk reduction that clients can use to maximize their future safeguard investments.
4. The ROI for each known safeguard for this type of facility.
5. A list of critical safeguards for the facility and the ability to perform a facility audit (S.O.S. Audit) to validate their effectiveness and the current risk level.

PHA Analytics

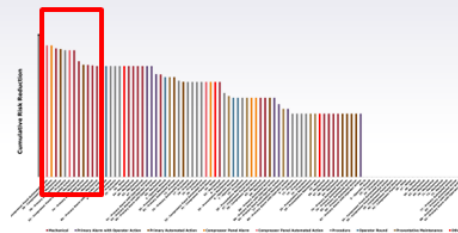
We Convert Hundreds of Pages of This...

Causes	Cause Location	Consequences	CAT	Risk Matrix S L RR	Safeguards	CAT	Risk Matrix S L RR	Recommendation	Responsibility	Drawings	Remarks
1. Gas Cooler louvers malfunctions open.	DWG- 1234-AA	2.7.1.1. Freezing of tubes; damage to tubes; leaks; loss of containment of H2S; fire or explosion; health and safety impact.	H&S	5 4 1	1. Other - Personnel in area less than 10% of time. 2. BPCS - TAL-123 alarm with operator action.	OTHER	5 2 1	2. Add freeze protection or fixed gas detection to Gas Cooler to prevent / detect gas leaks due to freezing in tubes.	Process Engineer	DWG- 1234-AA	
		2.7.1.2. Freezing of tubes; damage to tubes; leaks; loss of containment of H2S; fire or explosion; regulatory impact.	REG	3 4 1	1. BPCS - TAL-123 alarm with operator action.	BPCS	3 3 1	2. Add freeze protection or fixed gas detection to Gas Cooler to prevent / detect gas leaks due to freezing in tubes.	Process Engineer	DWG- 1234-AA	
		2.7.1.3. Freezing of tubes; damage to tubes; leaks; loss of containment of H2S; fire or explosion; financial impact.	FIN	3 4 1	1. BPCS - TAL-123 alarm with operator action.	BPCS	3 3 1	2. Add freeze protection or fixed gas detection to Gas Cooler to prevent / detect gas leaks due to freezing in tubes.	Process Engineer	DWG- 1234-AA	
		2.7.1.4. Freezing of tubes; damage to tubes; leaks; loss of containment of H2S; fire or explosion; reputation impact.	REP	2 4 1	1. BPCS - TAL-123 alarm with operator action.	BPCS	2 3 1				1. Existing safeguards are considered adequate.

Into Something You Can Use to Make Decisions:

Safeguard Criticality Analysis

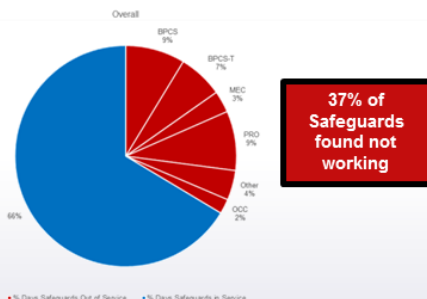
Do you know which safeguards in your facility are protecting you the most?



Rank	Recommendation Number	Recommendation Description	Recommendation Category	Score
1	Rec-101	101. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
2	Rec-102	102. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
3	Rec-103	103. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
4	Rec-104	104. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
5	Rec-105	105. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
6	Rec-106	106. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
7	Rec-107	107. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
8	Rec-108	108. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
9	Rec-109	109. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5
10	Rec-110	110. Develop adequate detection system including sensors and program for maximum coverage.	Preventive Maintenance	1.5

Recommendation Prioritization

Out of your list of HAZOP action items, which recommendations will provide maximum value and return for your facility?



Safe Operating Status (S.O.S.) Field Audit

What is the gap between the safeguards used for risk reduction in your risk assessments and the current operation?



Current Offerings:

As we continue our research on the Risk Alive project we are discovering new learnings. So far we can profile a single piece of equipment to profiling against industry. We can compare a specific risk data set to the average of others and then determine what's critical, what the performance is, create new perspectives (dependencies), and test for strengths and weaknesses. We also rank everything in relation to everything else. We have started profiling our own people and individuals (PHA leaders) in an effort to improve and recognize strengths and weaknesses. We offer this to other PHA leaders to see how they compare.

1) **Profile a company's group of facilities, a single facility, a single process unit, a major piece of equipment**

We learn which safeguards, which recommendations, which causes/threats, which equipment, which hazardous scenarios are the most critical. Then rank everything.

2) **Profile a PHA leader**

We learn what strengths, weaknesses and the areas for improvements for rigor, consistency, efficiency, culture, and dependencies are. We rank everything then create the dependencies based on the category, and contributing factors.

3) **Profile the Safeguards and learn the dependencies**

We learn how reliant your facility's specific types of safeguards are and how likely that these safeguards that are used as credits in a risk assessment are still working. We will show you the importance of knowing which safeguards are critical.

Where is the Benefit?

You likely do similar work to us: risk identification, PHA's, HAZOP/LOPA's, PSM elements, and you understand and appreciate what we do. So, if we are excited about something, chances are that you will want to know as well.

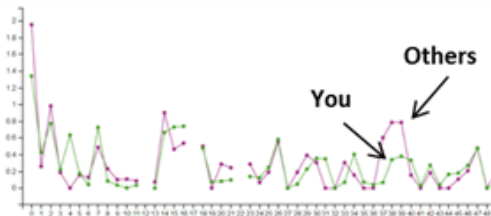
I believe we can enable you to help your clients become *Best in Safe*, a term that I used in my first book. It talks about how there is so much that can be done to stay safe and yet people tend to do the minimum. People doing work like us, and have knowledge in process safety, understand that making the world a safer place is challenging with many PHAs become checklists and many PHA recommendations stay undone. Quality and thoroughness are overlooked and many clients judge whether a PHA is done well by if it is finished on time or early. We'd like to change this with your help.

As risk consulting is a pillar of our business as well, we have already exposed some of our clients to these Risk Alive Analytics and are currently experiencing success cases. The Prep Package has



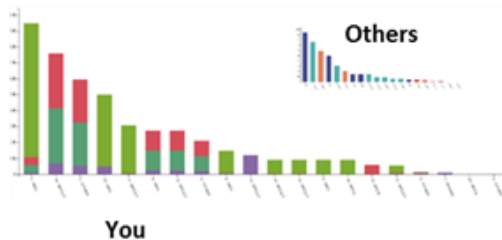
clients excited about improving the rigor of their PHA studies and has assisted winning PHA work in RFP situations by proving quality and moving the HAZOP beyond a checkbox exercise. Clients who have been struggling with regulatory compliance and gaining management approval for recommendations have been able to use Recommendation Prioritization to improve their regulatory submissions as well as build a stronger business case to expedite recommendation implementation. Safeguard Criticality combined with the SOS Audit has provided a clearer picture to our clients on their existing risk in their facilities, including their active and inactive safeguards, leading to adjusted maintenance priority schedules and improved operator training. The following page has a graphical representation on the different categories that can be selected for the development of Risk Alive Analytics client reports.

We look forward to working with you to continue carrying the message of Risk Alive Analytics to the market and continuously enabling clients achieve *Best in Safe* in order to make sustainable change to Process Safety.



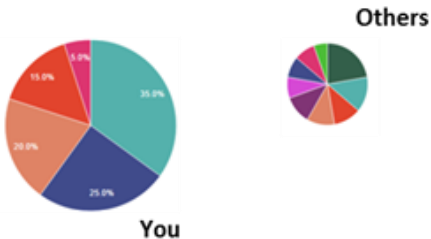
Understand and Improve on:

- | | |
|--------------------------------------|---------------------------------------|
| <input type="checkbox"/> Consistency | <input type="checkbox"/> Dependencies |
| <input type="checkbox"/> Rigor | <input type="checkbox"/> Culture |
| <input type="checkbox"/> Efficiency | <input type="checkbox"/> Other |



Prioritize your Critical:

- | | |
|--|--|
| <input type="checkbox"/> Safeguards | <input type="checkbox"/> Hazardous Scenarios |
| <input type="checkbox"/> Recommendations | <input type="checkbox"/> Other |
| <input type="checkbox"/> Causes | |
| <input type="checkbox"/> Equipment | |



Analyze the Distribution of:

- | | |
|---|--|
| <input type="checkbox"/> Safeguards | <input type="checkbox"/> Hazardous Scenarios |
| <input type="checkbox"/> Investment ROI | <input type="checkbox"/> Other |
| <input type="checkbox"/> Incidents | |
| <input type="checkbox"/> Residual Risk | |

Build a Profile of the:

- | | |
|------------------------------------|--|
| <input type="checkbox"/> Company | <input type="checkbox"/> Process Units |
| <input type="checkbox"/> Facility | <input type="checkbox"/> Individuals |
| <input type="checkbox"/> Equipment | <input type="checkbox"/> Other |

internally or to industry