SAP Innovation Awards 2022 Entry Pitch Deck

Indorama Ventures Adaptation of AsInt’s Mechanical Integrity (MI) solution in SAP Intelligent Asset Management

Indorama Ventures / AsInt, Inc.

PUBLIC
Company Information

Headquarters  Bangkok, Thailand

Industry  Chemicals

Web Site  https://www.indoramaventures.com/

Indorama Ventures has operating sites in 33 countries on six continents – in Africa, Asia, Australia, Europe, North America, and South America. Indorama Ventures is a world-class chemicals company with an integrated global leader in PET and fibers, serving major customers in diversified end-use markets.

For over a decade Indorama Ventures has made sustainability a priority within its business model. “Our business potential and resilience is tied to our environmental responsibility and social empowerment.”

Our key success factors are our global scale with local presence, our leadership position in the market, our innovation and partnerships with customers, our high level of backward integration and lastly and importantly powered by our “ONE IVL” approach -- Mr. Aloke Lohia, Group Chief Executive Officer

We see sustainability as a transformative journey that demands constant and continuous improvements, and IVL intends on being a thought leader delivering a more sustainable and circular ecosystem in the future -- Yash Lohia, Chief Sustainability Officer

Our company has sustainability goals across the board from energy and green house gas reductions to increased renewable energy and recycling. Since 2011, Indorama Ventures has recycled over 67 Billion bottles with a commitment to 50 billion bottles annually representing over 750,000 ton of post consumer PET per year.
**Challenge**

Indorama was interested in a solution that could scale and assist them in realizing maximize efficiencies in various business processes and take their existing mechanical integrity program and strategies and integrate them with Indorama maintenance and business processes. The current system was complex, siloed, and had out-of-sync data.

**Solution**

AsInt and SAP Asset Strategy and Performance Management, Risk Based Inspection (RBI) and Inspection Data Management System (IDMS) extend the current SAP Asset Strategy and Performance Management code-based. Most of the codebase and functionality (nonfunctional and functional) have been implemented within mature organizations in various continents worldwide. These ensure the core building blocks, such as Asset Management, Templates, Master Data, Internationalization and Localization, Plant Maintenance Integration are sound.

**Outcome**

AsInt’s RBI (Risk Based Inspection Apps) and IDMS (Inspection Data Management System Apps) extend the current SAP Asset Strategy and Performance Management code-based. Most of the codebase and functionality (nonfunctional and functional) have been implemented within mature organizations in various continents worldwide. These ensure the core building blocks, such as Asset Management, Templates, Master Data, Internationalization and Localization, Plant Maintenance Integration are sound.

- **30%** Reduction in Inspection costs across the facility
- **4X** Increase in productivity
- **10X** Over five years, the benefit generally 5 to 20 times the cost of implementation
“Our relationship with AsInt started when we were evaluating various Mechanical Integrity options for our site facility. We ultimately selected AsInt/SAP to implement our ASPM/RBI/IDMS solution. Based on our rapid growth trajectory, we were looking for a solution that could scale and assist us in realizing maximize efficiencies in various business processes. Additionally, striving for continuous improvement, we were looking for a solution to take our existing mechanical integrity program and strategies and integrate them with our maintenance and business processes.”

Joel Presley (PNO Inspection Team Leader)

“A critical work process for Mechanical Integrity is Risk-Based Inspection (RBI), which allows us to prioritize asset inspection planning based on the consequence and likelihood of failure versus traditional time-based interval planning. A good RBI approach allows us to prioritize the inspection plan based on the prediction likelihood of failure versus the traditional time-based or condition-based inspection plan. With AsInt/SAP, we can take it to the next step by integrating transitional risk evaluation to maximize the efficiency of the inspection program.”

Adam Wallace (PNO RBI Coordinator)
Participating Partner Information

AsInt, Inc.

Developed the Mechanical Integrity Applications within SAP Intelligent Asset Management

For many years, fixed equipment inspections relied on the very conservative principles of fixed inspection intervals that were meant to ensure equipment damage could be found and corrected before it became a problem. These intervals were prescribed in the various inspection codes and required little knowledge of risk. The downside to this method was that equipment of low risk was required to be inspected at the same interval and to the same extent as equipment of significantly higher risk.

In the early 2000’s, the concepts of risk ranking associated with PSM hazard studies began to be used for relative risk ranking of plant fixed equipment. API-580 was initially published in 2002 for establishing risk-based inspection programs. While API-580 established the concept of risk acceptance, its usage was limited to mitigation of nonconformances and repair evaluations while inspection frequencies were still arbitrarily established within most risk-based inspection software.

About 3 years ago, Indorama PNO and Dayton facility expanded the use of risk acceptance to establishing next inspection plans. By doing this, their facility was able to move away from arbitrary intervals and make use of the efficiencies associated with inspecting based on relative risk ranking.

While this new practice helped us realize significant improvements in the inspection program, the software was not capable of automating the process which meant that significant manual effort was required to run multiple “what-if” analyses to reach the conclusions needed.

In 2020, our facility decided that we would be moving away from the previous software to the SAP Intelligent Asset Management and AsInt’s Risk Based Inspection and Inspection Database Management software solution. During implementation, it became evident that the flexibility of the software made it possible to fully utilize the concepts of API-580 by automating their new risk-based inspection strategies. AsInt has spent significant time and effort working with Indorama PNO and Dayton to make this expansion of risk-based philosophy a reality. We expect that this step change in inspection planning will be able to reduce the cost of the inspection program significantly while maintaining the overall risk of the facility to a level approved by plant management.
Business Challenges and Objectives

Business Challenges

- Complex and siloed with customized technology, out-of-sync data and processes, and various applications.
- Each unit has its unique processes, resulting in multiple variable accuracies.
- Disparate & niche applications Inconsistent data
- Expensive, unsustainable, limits innovation and business agility.

Project Objectives

- Define the necessary dataset to address the SAP Master Data mechanical integrity.
- Develop critical applications to consume the data with flexible embedded algorithms to help customers understand the current and future state.
- Providing insight to these critical assets with regards to the pressure boundary of the asset and the avoidance of loss of containment.
- Integrating this Mechanical Integrity data into the SAP work process of planning and execution.
- A critical work process for Mechanical Integrity is Risk-Based Inspection (RBI). A good RBI approach allows the operator to prioritize the inspection plan based on the prediction of failure versus the traditional time-based or condition-based inspection plan.
Over the last few decades, OTS (off-the-shelf) software, or internally developed digital solutions, have been developed to manage the individual layers. These software functions are designed to address Inspections, Maintenance, Risk, Pressure Relief, Safety Instrumented Systems, and many other functions like HAZOP. In many cases, this has led to predicting or preventing failures. However, strong evidence suggests disconnected digital solutions designed to provide insight have had the opposite effect. These "data silos" prevent operators from seeing the whole picture regarding their "Layers of Protection" effectiveness, often leading to minor or catastrophic releases. The solution to the "data silo" dilemma is to consolidate the software functions and data to address the various layers into a single platform. A single platform allows the operators to have a consolidated view of the physical and virtual assets designed to address a Loss of Containment. This big picture view greatly increases the knowledge of day-to-day decision-making to run the plant (OPEX) and future investments (CAPEX).

SAP has recently extended its traditional Asset and Work Management solutions to get closer to the physical asset with the addition of SAP Asset Intelligence Network, SAP Asset Strategy and Performance Management, and SAP Predictive Asset Insights.
The platform addresses each layer's large functions, including key data on the physical equipment and assessments and the work management and documentation of the assets that make up the containment layers. Within the platform, there are interconnected Apps to address FMEA (Failure Mode and Effect Analysis) and RCM (Reliability Centered Maintenance). Additionally, the platform allows for SAP partners, like AsInt, Inc., to develop Apps to address other layers such as Risk Based Inspection (RBI), Thickness Management (TM) and Inspections, and Safety Instrumented Systems (SIS) functions. Performing these functions within the SAP ecosystem ensures all data needed to manage the Swiss cheese model is consolidated within the SAP Master Data. Removing data silos and disconnected work processes.
Business Process Details

Process Before

- Risk Based Inspection has been around for 20+ years at this stage. Though the various approaches and calculations have been vetted, most of the analysis has been performed outside of the EAM (Enterprise Asset Management) and ERP (Enterprise Resource Planning) system. The primary value of the RBI analysis is to schedule and perform work to address the risk of failure. Performing these functions outside of the EAM and ERP leads to duplicate data, overlapping work, and gaps in the data and work processes to address functional failures.
- Most of the inspection data results are managed on corporate file servers, within an Inspection Data Management System (IDMS) operated by a 3rd party inspection and maintenance contractor or stored within a silo’d database from a commercially available software.
- In all these circumstances, critical equipment data, inspection results, and key recommendations are stored outside of the Enterprise Asset Management (EAM) solution and work management solution. This silo’d approach provides barriers to the inspection, maintenance, and reliability managers from connecting-the-dots to avoid failures.

Process After

- Perform the RBI analysis as an embedded work process inside SAP. Eliminating the need for duplicate assets and asset related data in multiple systems, while streamlining the work planning and PDCA (Plan, Do, Check, Act) work processes.
- Perform the inspection data management and analysis as an embedded work process inside SAP. Eliminating the need for duplicating asset related data, storing condition data and assessment data in a centralized source for others to view, while connecting the inspection recommendations to the work management solution for triaging.
- Remove multiple asset registries.
- Connecting the Enterprise EAM ‘dots’ for tactical and strategic decisions
- Eliminate data silos and disconnected work processes
- Embed MI functions in SAP Asset Intelligence Network and SAP Asset Strategy and Performance Management
Benefits and Outcomes

**Business or Social**

- RBI allows to focus limited resources on high critical items
- Avoid failures, specifically loss of containment, before it happens
- Moving this function into the EAM, ensuring the work process is far more sustainable
- Integrated with existing business processes like Management of Change, Work Management, etc.

**IT**

- Consolidated IT infrastructure
- Removes data silos
- Single Sign-on
- Not reliant on a single OEM of the apps when on a scalable platform, many vendors are on
- Robust, Integrated, and Scalable

**Human Empowerment**

- Typically, the Mechanical Integrity (MI) software (RBI, Inspections, Thickness Monitoring, etc..) has been performed outside of the EAM.
- This has duplicated information in the MI software and EAM and causes duplication and waste of energy in areas like training, IT setup, etc.
- By adding the MI functions and data inside SAP, alongside the Work Management and Asset Registry, this starts to embed tribal knowledge and analysis into a sustainable solution for the people responsible for addressing Loss of Containment events.

* IT benefits are required if you are using SAP Business Technology Platform products
## Deployment Details 1 of 2

**Deployment status**  Live  
**Date**  7/1/2021

### Number of end users  100 - 200  
### Number of customers  7

#### SAP® technologies used:

<table>
<thead>
<tr>
<th>SAP product</th>
<th>Primary product</th>
<th>Deployment status</th>
<th>Contribution to project</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP Integration Suite</td>
<td>X</td>
<td>Live</td>
<td>Ecosystem for the Application Development and non-functional needs such as security</td>
</tr>
<tr>
<td>SAP Intelligent Asset Management</td>
<td>X</td>
<td>Live</td>
<td>Access to Asset Central Foundation and other functions such as security roles</td>
</tr>
<tr>
<td>SAP Asset Strategy and Performance Management</td>
<td>X</td>
<td>Live</td>
<td>Extending SAP Asset Strategy and Performance Management to calculate RBI and Thickness monitoring</td>
</tr>
<tr>
<td>SAP Analytics Cloud</td>
<td>X</td>
<td>Live</td>
<td>Data analytics of the information generated</td>
</tr>
</tbody>
</table>
The following offerings from SAP Services and Support were utilized during the implementation or deployment phase

- SAP MaxAttention™
- SAP ActiveAttention™
- SAP Value Assurance
- SAP Advanced Deployment
- RISE with SAP for Industries
- Other:

SAP Advisory Services
SAP Customer Experience Solutions
SAP Preferred Success
SAP Enterprise Support
SAP Solution Manager
SAP Cloud ALM

Contribution to the project

SAP/AsInt solutions offering has provided a link between inspection mitigation plans and maintenance workflow. This has reduced the IT cost of ownership significantly, and the Asset Integrity is now on a scalable and sustainable platform.
The following **advanced technologies** were part of the project.

<table>
<thead>
<tr>
<th>Technology or use case</th>
<th>Product *</th>
<th>Contribution to project and how product used integrates with SAP products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Intelligent technologies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A) Machine learning or artificial intelligence</td>
<td>Conversational AI, AI-based knowledge graph, AI Business Services, Robotic process automation</td>
<td></td>
</tr>
<tr>
<td>B) Blockchain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C) Internet of things</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2 Intelligent data management</strong></td>
<td>Yes</td>
<td>Extending the SAP Intelligent Asset Management suite</td>
</tr>
</tbody>
</table>

*If this is not an SAP product, explain how it integrates with SAP products.*
Advanced Technologies (2 of 2)

The following advanced technologies were part of the project.

<table>
<thead>
<tr>
<th>Technology or use case</th>
<th>Product</th>
<th>Contribution to project and how product used integrates with SAP products</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Advanced cloud integration</td>
<td>Yes</td>
<td>Seamless transition from SAP Intelligent Asset Management to backend plant maintenance</td>
</tr>
<tr>
<td>New business models using API’s, Connecting business partner(s) with API’s, Integration Advisor, Digital integration hub architecture, Event Mesh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Advanced and augmented analytics</td>
<td>Yes</td>
<td>Predictive algorithms to understand current and future state of failure, or loss of containment, probability</td>
</tr>
<tr>
<td>Real-time and streaming analytics, spatial analytics, natural language processing, machine learning to identify trends, patterns, and outliers, predictive analytics and planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Combined transactions and analytics on single data set</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce data latency and footprint from dedicated data marts, data warehouses and data lakes (&gt;1TB)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*If this is not an SAP product, explain how it integrates with SAP products.*
Additional Information

AsInt is changing how people develop, deliver, and access software for the oil and gas and petrochemical industry. Our goal is to create a full suite of applications that meet a range of asset integrity needs no matter the platform. The software is accessible via app stores and it’s purpose ease of use software. Below is some detailed information about our solution in SAP.

Demo:
- https://www.youtube.com/watch?v=ZAYPn_rnt8M

Use Cases:
- https://asint.net/rbi-risk-based-inspection
- https://asint.net/idms-inspection-data-management-system
- https://asint.net/sap-master-data-to-management-my-mi-program

The functionality of the APPs:
- A good overview of the Functionality of AsInt's Mechanical Integrity APPs:
  - Risk-Based Inspection (RBI) https://asint.net/core-rbi-for-sap
  - Inspection Database Management System (IDMS) https://asint.net/core-inspection-for-sap
- AsInt is a software company developing Mechanical Integrity Applications as a native capability within the SAP Intelligent Asset Management suite
- AsInt Apps are SAP Master Data Governance driven applications, extending the SAP Intelligent Asset Management suite functionality
- Deployed within the SAP Fiori launchpad for seamless use with the SAP Intelligent Asset Management suite
- Typical software solutions have been performed outside of the EAM, causing disconnected and siloed data
- All data are stored within the SAP Master Data Governance
- Combined with SAP cross-industry reliability applications (RCM, FMEA, etc.), adding AsInt Mechanical Integrity Apps moves critical data and information in a consolidated data source
Additional Information

The functionality of the APPs:

- Allowing operators to have a single asset registry and critical data to make tactical and strategic decisions
- Definition of CML’s (condition monitoring locations) and associated algorithms like Tmin, Max Working Pressure, Corrosion Rates, etc.
- Document uploads and linking
- Direct integration to SAP notification process if issues are identified in the inspection
- Empowering Faster Decisions
- Creating a Single Version of the Truth
- Ability to perform basic and intermediate data analysis
- Improving data quality through transparency
- Enabling efficient workflow automation
- Reducing time spent in searching for data
- Developing a foundation for Artificial Intelligence
- AsInt Apps is developed on the Cloud Foundry environment. We have enhanced SAP products, integrated business applications, and created entirely new enterprise applications based on business APIs hosted on the SAP Integration Suite.

With the migration to SAP Integration Suite - Cloud Foundry landscape, you will get additional benefits such as:

- The added advantage is to get an integrated solution of SAP Intelligent Asset Management products running on a standard Asset Central foundation layer.
- New unified SAP Fiori launchpad provides a consistent and enhanced user experience across products.
- It increased network capabilities for SAP Asset Intelligence Network customers.
- The Cloud Foundry environment allows you to use multiple programming languages such as Java, Node.js, and community/bring-your-own language options.
Additional Information

Useful YouTube videos:

- Manage CCDs, or Corrosion Control Documents, using the SAP Intelligent Asset Management & AsInt App (with commentary) [YouTube Link]
- AsInt Asset Integrity General Video (with commentary) [YouTube Link]
- EAM and APM are Merging [YouTube Link]
- Adaptable Risk Models [YouTube Link]
- Data Replicator Data and Conduit [YouTube Link]
- Scalable Data Management for Mechanical Integrity and Beyond [YouTube Link]
- CML Distribution with AsInt Apps and Content [YouTube Link]
- Managing Thickness Data in SAP [YouTube Link]
- End to End Planning, Execution, and Follow-Ups with SAP Intelligent Asset Management and AsInt Apps [YouTube Link]
- SAP overview of Core RBI and IDMS [YouTube Link]
- Using the SAP Master Data Governance to manage Mechanical Integrity [YouTube Link]
- Inspections to Notifications in SAP [YouTube Link]
- Raise SAP notifications from an Inspection [YouTube Link]
- Getting Started with SAP Intelligent Asset Management Representative Assets [YouTube Link]
- No Matrix Limitations [YouTube Link]

AsInt, Inc.
Rohan Patel
CEO

Follow us:
Additional Information

Company Vision, Mission and Values

VISION
To be a world-class sustainable chemical company making great products for society

MISSION
We commit to be a responsible industry leader leveraging on the excellence of our people, processes, and technologies to create value for our stakeholders.

VALUES
- The **customer** is why we exist.
- Our **people** make the difference.
- We see **change** as an opportunity.
- **Diversity** is our strength.
- We are safe and **responsible**.