Reducing Delays In Document Management And Tooling Costs Of Refineries And Plants: A Case Study Of Risk Management Software Development

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A complex etiology of risk

Causes of injuries

- Height falls
- Explosion/Burn
- Water Related/Drowning
- H₂S / Confined Spaces
- Car Accident
- Scrape/Cut
- Struck by
- Electrical exposure

Sources:
- WorksafeBC
- European Petroleum Refiners Association
- US Dept of Labor
A complex etiology of risk

The Hidden Causes

First Cause
Procedural mistakes / Lack of maintenance

Previous Cause
Lack of information

Last Cause
Explosion

Piper Alpha (North Sea)  I  Deepwater Horizon (Mexico Gulf)  I  Paraguaná Refinery Complex
A complex etiology of risk

A complex Etiology of Risk Requires a System/Holistic Approach

- A global repository of information
- To quickly reach information & documentation
- A way to relate heterogeneous information

WE NEED A SOFTWARE

An adequate risk management system
Building the System

The solution adopted follows a descriptive journey along a 7-level model and step-by-step process:

1. Crossing the data
2. Recording and situating events
3. Getting real-time tools
4. Implementing rules and automatic controls
5. Setting people & facilities in motion
6. Managing and storing static information
7. Organizing the system
1. Organizing the System

**Independence**

- Safety isn’t a «shell» of production
- A service carried out by someone else. Third party
- Skills: $\text{H}_2\text{S}$, haz. gas, fire risks. But also a general safety culture

**Architecture**

- Client/Server: several users, simultaneous sessions
- Cross/platform solution. Multi-tier architecture
- Multilingual / modular software

**Preliminary configuration**

- The crucial role of the Company: directives
- Legislations technology. Standards management systems
- Legislations Flexible Checklists, Surveys, Historical data, alert system
2. Managing and storing static information

Where

Workplaces / Sites
- Wells & small plants
- Hierarchy of macro-areas, areas & production units

Who

A «commonwealth»
Company & contractors
- 700 Contractors
- Personnel (5,000 people)
- Job contracts & transfers
- Courses & certificates

What

Equipment & tools (categories)
- Cars, cranes, trucks
- Personal protection equipment

SW-TOOLS | DMS | Checklist | Surveys | Forms
3. Setting people & facilities in motion

Managing Work Permits

- Organized by locations, types of work, contractors, originators, approvers, company supervisors and scheduling
- Recording starts, authorizations, stops, suspensions, retakes
- Associate attachments, surveys, actions and controls

An Access Control System

- Programmed work permit
- In execution work permit
- Closed
- Suspended work permit
- Waiting to extend (shift)

- RFID Mifare or Biometrics technology
- Badge validity is dependent on worker’s checklists
- Vehicle tracking/Vehicle permits
- Interchangeable inputs: fix readers & tablet
- Crossing access validations and work permits
4. Implementing rules and automatic controls

- A type of work
- A workplace or a specific location/area
- An associated service order

Area of Applicability

- A type of work
- A workplace or a specific location/area
- An associated service order

Condition on the work features

Requirements met totally or partially (a % or at least a number)

Mandatory requirements

- One or more training certificates present
- A specific checklist item met
- A form/survey filled
5. Getting real-time tools

Personnel tracking

- Updates every second
- Outdoor displays near muster points
- Number and optional names

Layout of in execution work

- Drill down macro areas, areas and single work permits
- Pan and zoom the map
- Manage mobility at the plant
6. Recording and allocating/placing events

Safety Indicators

- Recording observations, near misses, incidents, accidents, injuries
- Calendar with daily, weekly, monthly and yearly disaggregation
- A man-hours journal organized for each site, contractor & desired period
7. Data crossing

- A Business Intelligence platform
- Interactive views and statistics of data for HSE management
- Contextual factors & environmental situation of bad events
- Transforming descriptive crossed information to prescriptive actions
Results & Conclusion

- A repository from which you can browse 170,000 documents with just a few clicks.
- An all-in-one monitoring safety tool for 850 contractors.
- A tangible tool to study trends and correlating information.
- A significant time loss reduction and decrease in associated costs.
- Cost optimization planning for future projects.
- A fit-for-purpose way to improve safety in the biggest upstream plant in Europe.

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<th>Installation</th>
<th>Start</th>
<th>Scanned Documents</th>
<th># Entities inserted</th>
<th>Average docs / entity</th>
<th>Checklists</th>
<th>Active checks</th>
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<td>Nov 2012</td>
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<td>~ 75.000</td>
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Acknowledgements / Thank You / Questions