



# PSM DASHBOARDS AND METRICS

Arturo Trujillo  
DEKRA SE



# Agenda

Why do we measure?



The DEKRA Safety Platform



Organizational Process Safety



Dynamic Dashboard



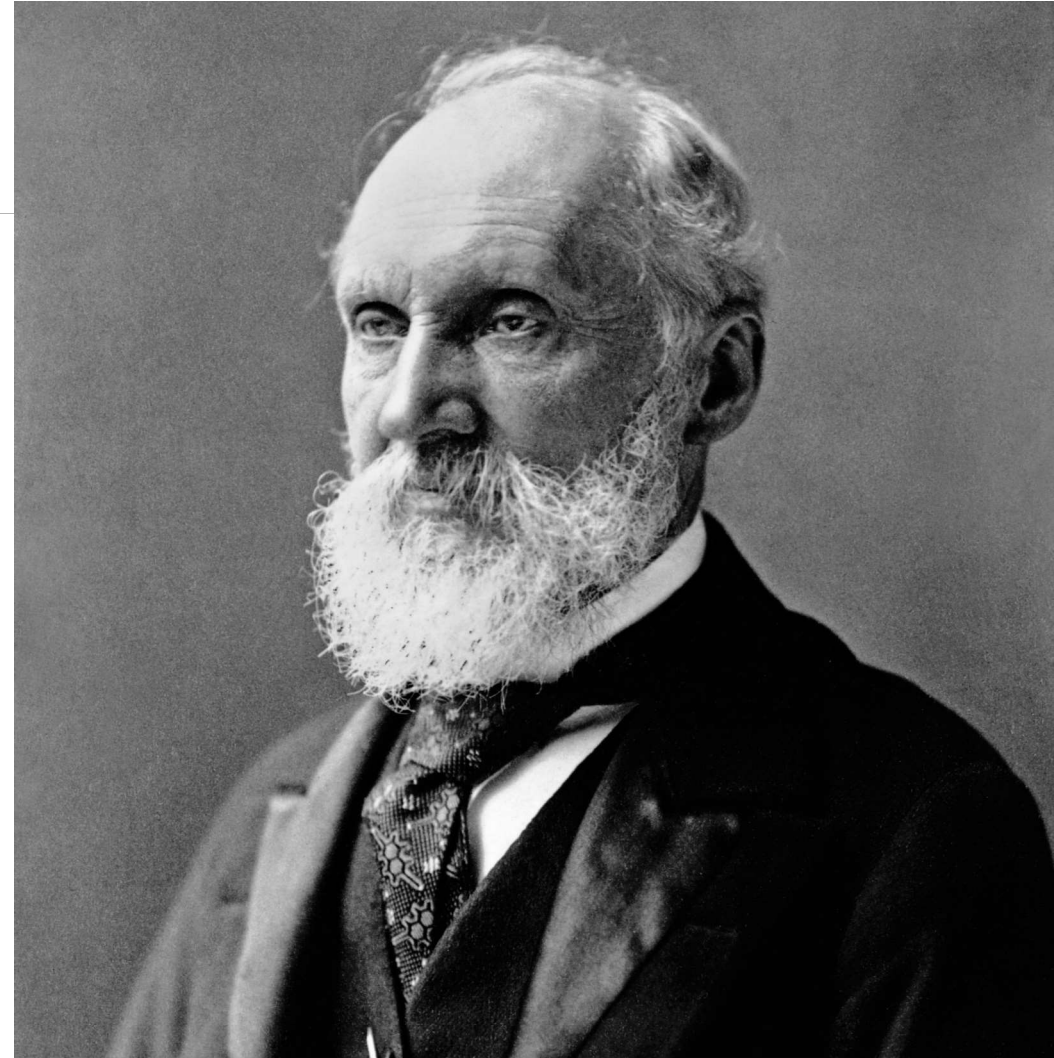
Sneak preview. Dynamic Risk Register



## Why do we measure?

*“When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts advanced to the State of science, whatever the matter may be.”*

(William Thomson, 1st Baron Kelvin, Lecture to the Institution of Civil Engineers, 3 May 1883)

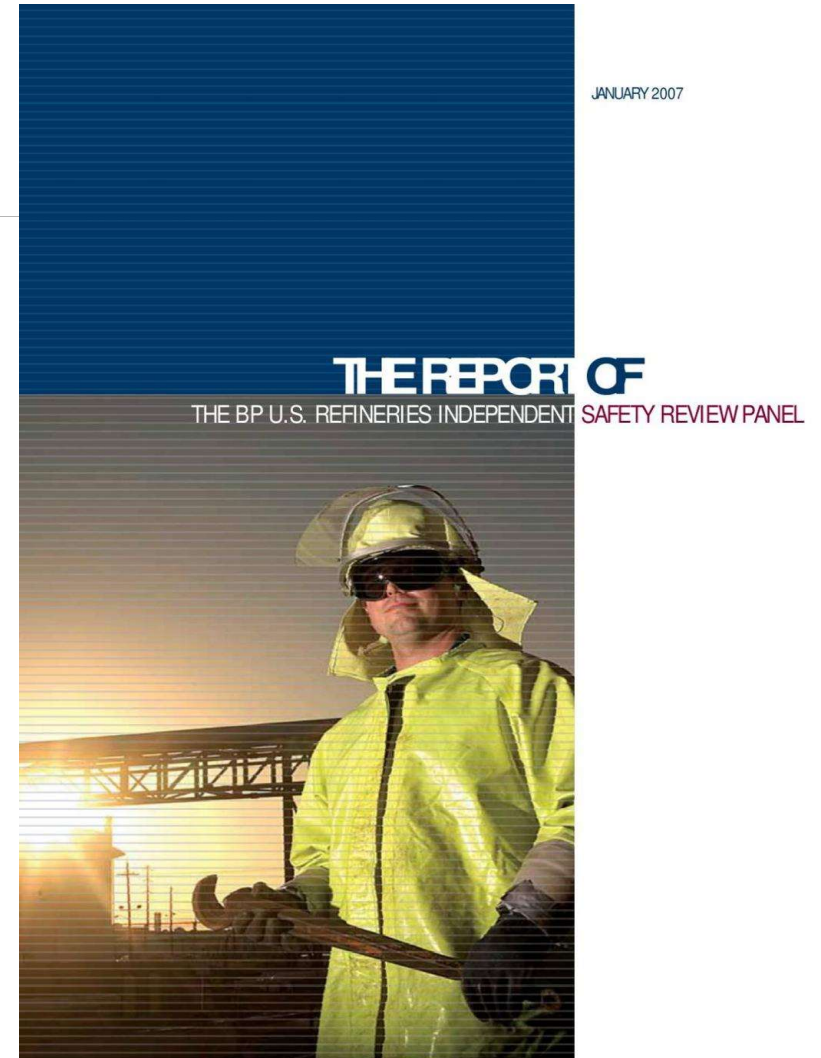




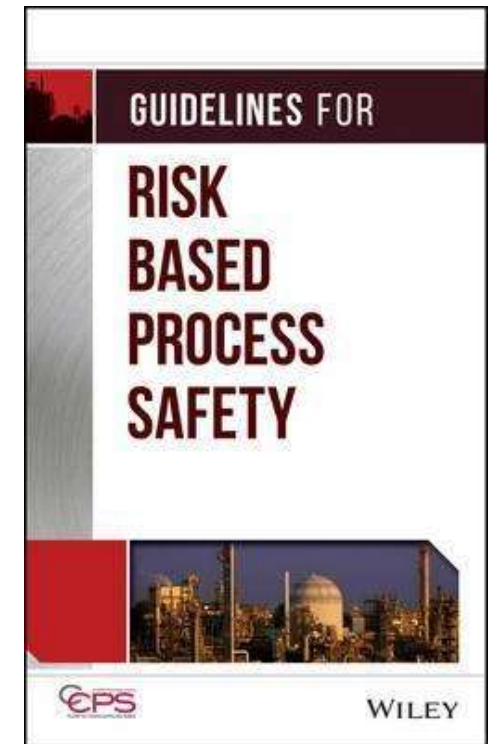
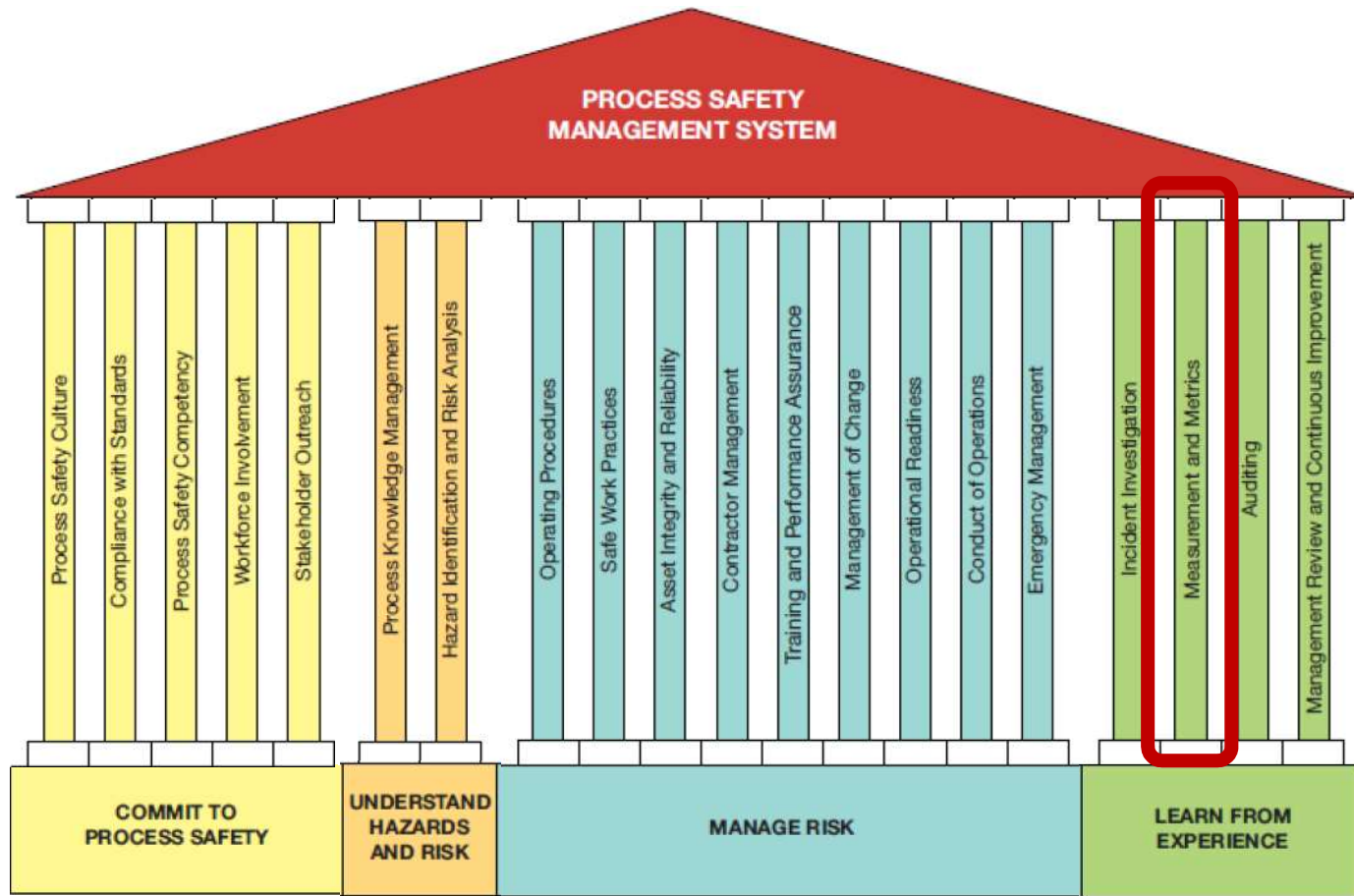
## Why do we measure?

*“Regular measurement and monitoring of process safety performance allows an organization to evaluate the effectiveness of steps taken to control and reduce process risk.”*

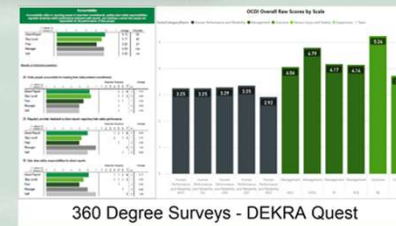
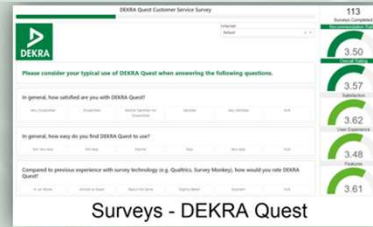
Management of Hazards Associated with Location of Process Plant Buildings, RP 752, American Petroleum Institute, Washington DC, November 2003. Quoted on the Baker Panel Final Report, 2007



# CCPS – Risk-Based Process Safety (RBPS)

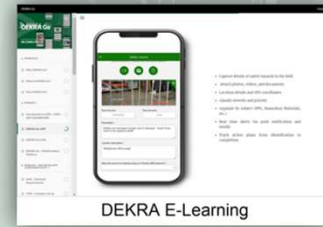
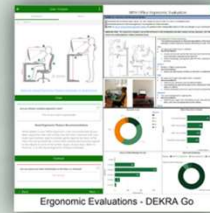
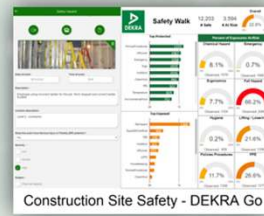


# DEKRA Safety Platform™



Cultural Assessment - DEKRA Quest

| Management | Supervisory | Team | Operative | Management | Supervisory | Team | Operative |
|------------|-------------|------|-----------|------------|-------------|------|-----------|
| 53         | 64          | 65   | 62        | 56         | 30          | 61   | 31        |
| 407        | 415         | 382  | 419       | 451        | 449         | 483  | 485       |
| 514        | 421         | 428  | 421       | 447        | 432         | 472  | 475       |
| 456        | 419         | 481  | 437       | 485        | 447         | 506  | 498       |
| 40         | 64          | 65   | 51        | 43         | 23          | 70   | 23        |
| 398        | 415         | 481  | 407       | 439        | 443         | 480  | 486       |
| 32         | 41          | 51   | 40        | 41         | 31          | 41   | 31        |
| 337        | 332         | 463  | 394       | 426        | 427         | 455  | 458       |
| 60         | 66          | 79   | 81        | 71         | 47          | 88   | 91        |
| 427        | 418         | 498  | 444       | 468        | 466         | 506  | 515       |
| 487        | 468         | 485  | 449       | 446        | 440         | 501  | 504       |
| 179        | 190         | 184  | 180       | 141        | 135         | 172  | 166       |
| 458        | 458         | 504  | 436       | 472        | 473         | 492  | 501       |
| 64         | 67          | 84   | 49        | 66         | 43          | 52   | 36        |
| 422        | 420         | 505  | 405       | 462        | 464         | 473  | 473       |
| 34         | 42          | 460  | 373       | 353        | 39          | 70   | 60        |
| 381        | 334         | 475  | 351       | 401        | 459         | 446  | 477       |
| 61         | 70          | 77   | 65        | 55         | 39          | 42   | 73        |
| 431        | 440         | 495  | 423       | 450        | 459         | 498  | 494       |
| 418        | 442         | 490  | 456       | 471        | 478         | 488  | 481       |
| 49         | 64          | 70   | 69        | 67         | 29          | 74   | 29        |
| 398        | 418         | 488  | 447       | 452        | 448         | 488  | 491       |



Since 2018, DEKRA has stopped building “hardwired” dashboards and other static tools. Instead, we have built the DEKRA Safety Platform (DSP), as an ecosystem of applications sufficiently flexible to accommodate our clients’ needs.



# Why?



## Flexibility

We have not built a hardwired solution, but a series of „building blocks“ that can be used to construct what is required in every case.



## Fully customizable

Any element (e.g. questionnaires, database structure, dashboards...) can be adapted to every client's need.



## Data security

DSP is based on a well-established technology stack: Microsoft Azure. Database is Microsoft SQL. This provides state of the art data security.



## Data analytics-ready

The information is collected in a well-structured manner. Therefore, building any ETL (extract, transform and load) pipeline for data analytics becomes very easy.

# Organizational Process Safety

MANAGER

- Assessments
- Clients

| Code                            | Name   | Technicians                                 | Score |           |   |
|---------------------------------|--|---|-------|-----------|---|
| Workstream 1. Capability        |  |   | 3     | Priority  |   |
| ○ 1                             | Compliance with standards                    | Arturo Trujillo (arturo.trujillo@dekra.com) | 4     | Goal      | ☰ |
| ○ 2                             | Process knowledge management                 | Arturo Trujillo (arturo.trujillo@dekra.com) | 2     | Necessity | ☰ |
| ○ 3                             | Process safety competency                    | Arturo Trujillo (arturo.trujillo@dekra.com) | 3     | Priority  | ☰ |
| ○ 4                             | Training and performance assurance           | Arturo Trujillo (arturo.trujillo@dekra.com) | 1     | Burden    | ☰ |
| Workstream 2. Incident response |  |   | 2     | Necessity |   |
| ○ 1                             | Stakeholder outreach                         | Arturo Trujillo (arturo.trujillo@dekra.com) | 1     | Burden    | ☰ |
| ○ 2                             | Emergency management                         | Arturo Trujillo (arturo.trujillo@dekra.com) | 3     | Priority  | ☰ |
| ○ 3                             | Incident investigation                       | Arturo Trujillo (arturo.trujillo@dekra.com) | 2     | Necessity | ☰ |
| Workstream 3. Risk management   |  |   | 3     | Priority  |   |
| ○ 1                             | Hazard identification and risk analysis      | Arturo Trujillo (arturo.trujillo@dekra.com) | 3     | Priority  | ☰ |
| Workstream 4. Asset integrity   |  |   | 3     | Priority  |   |
| ○ 1                             | Asset integrity and reliability              | Arturo Trujillo (arturo.trujillo@dekra.com) | 3     | Priority  | ☰ |
| ○ 2                             | Management of change                         | Arturo Trujillo (arturo.trujillo@dekra.com) | 2     | Necessity | ☰ |
| Workstream 5. Accountability    |  |   | 2     | Necessity |   |
| ○ 1                             | Measurement and metrics                      | Arturo Trujillo (arturo.trujillo@dekra.com) | 3     | Priority  | ☰ |
| ○ 2                             | Auditing                                     | Arturo Trujillo (arturo.trujillo@dekra.com) | 1     | Burden    | ☰ |
| ○ 3                             | Management review and continuous improvement | Arturo Trujillo (arturo.trujillo@dekra.com) | 3     | Priority  | ☰ |



# Organizational Process Safety

Assessments

←

Suggested interventions

| Element | Key principle                             | Essential feature   | Intervention  |
|---------|---|---|---|
|         |   |   | Workstream 1. Capability <span>Change</span>  |
| 3       | Maintain a dependable practice            | Establish objectives that are measurable and can be tied to the overall business performance. | Develop a set of measurable objectives for maintaining and enhancing process safety competency.   |
| 1       | Maintain a dependable practice            | Ensure consistent implementation of the standards system.                                     | Establish a standards element owner.  |
| 1       | Conduct compliance work activities        | Conduct compliance assurance activities.  | Monitor changes to standards via appropriate means.   |
| 4       | Monitor worker performance                | Test workers periodically.  | Establish a metric that will help alert management to any rapid increase in error rates.  |
|         |   |   | Workstream 2. Incident response <span>Change</span>   |
| 1       | Follow through on commitments and actions | Document outreach encounters.   | Keep records of lessons learned to guide future encounters.   |
| 1       | Follow through on commitments and actions | Document outreach encounters.   | Keep records on the activities involved in conducting the information sharing.  |
| 1       | Follow through on commitments and actions | Share stakeholder concerns with management.   | Determine near-term company plans that may affect stakeholders and begin planning activities to solicit input, identify possible concerns, and resolve issues.  |
|         |   |   | Workstream 3. Risk management <span>Change</span>   |
| 1       | Follow through on assessment results      | Maintain risk assessment records.   | Archive the HIRA results, along with key materials and information used by reviewers. Preserve the results on diverse media in redundant locations. Retain the HIRA results and key materials and information for a specified period (e.g., 1 year, 5 years, the life of the process) to support other PPS work activities. |

# Dynamic dashboard



- Home
- User Management
- Message Center

3  
#Clients

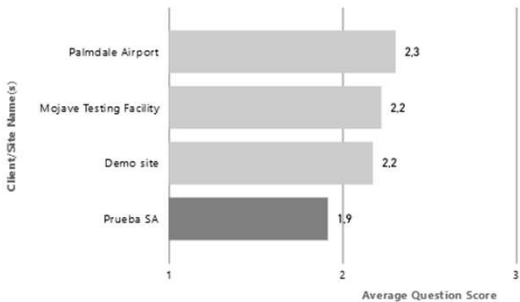
4  
#Sites

Selected Client(s)  
ACME Airlines; Demo client; Prueba Dekra ES; Wessex Water

Selected Site(s)  
Bath; Company Wide; Demo site; Mojave Testing Facility; Palmdale Airport; Prueba SA

Select Client(s) / Site(s)  
Selección múltiple

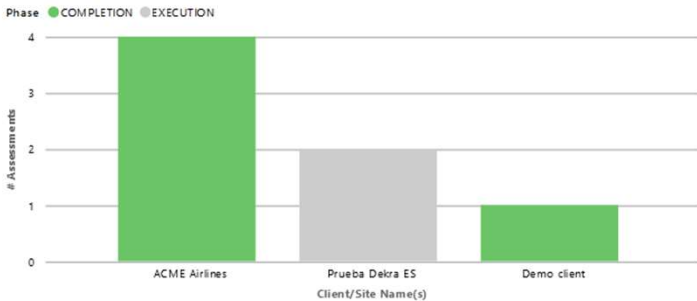
Avg Question Score by Client



Workstream Score Breakdown






Assessment Phase by Client

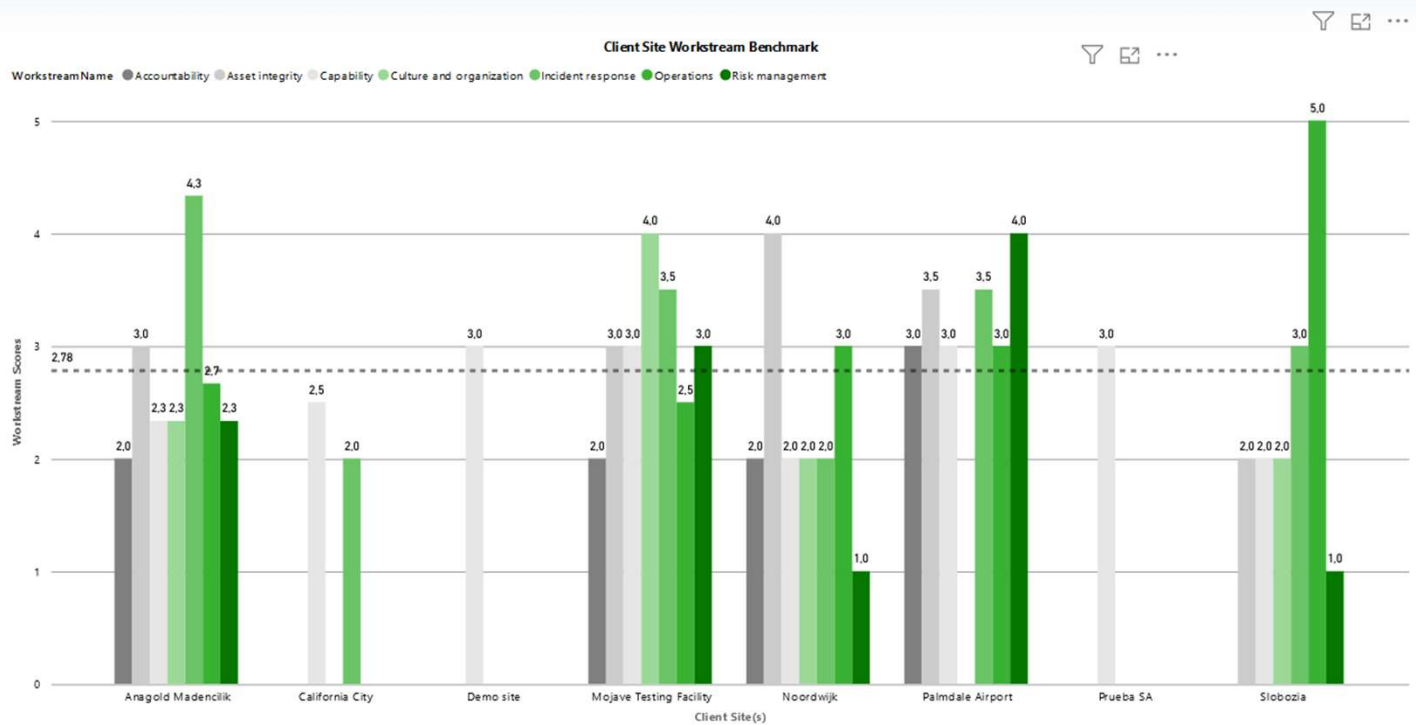


Client Map



# Dynamic dashboard

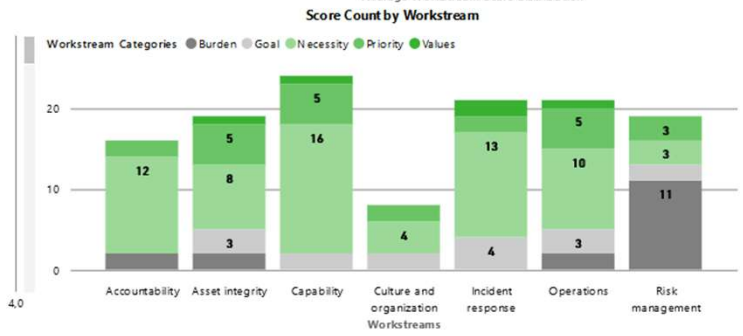
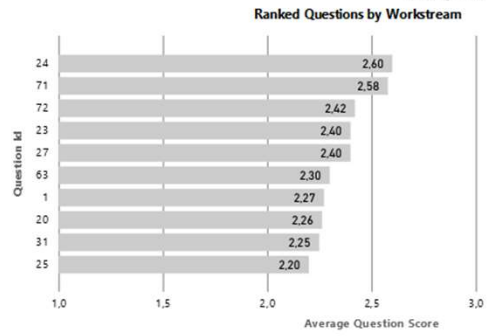
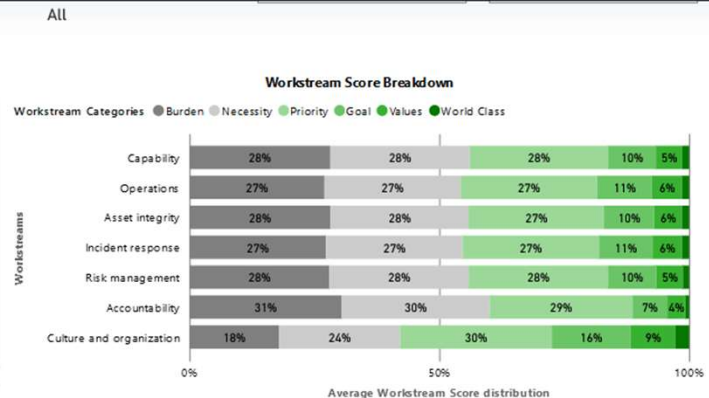
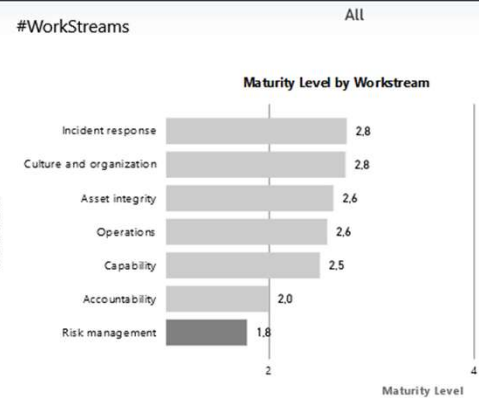
-  Home
-  User Management
-  Message Center



- Assessments
- Clients
- Client Site Benchmarking
- Client Workstream Average
- Client Element Average
- Capability Workstream Elements
- Incident Response

# Dynamic dashboard

- Home
- User Management
- Message Center

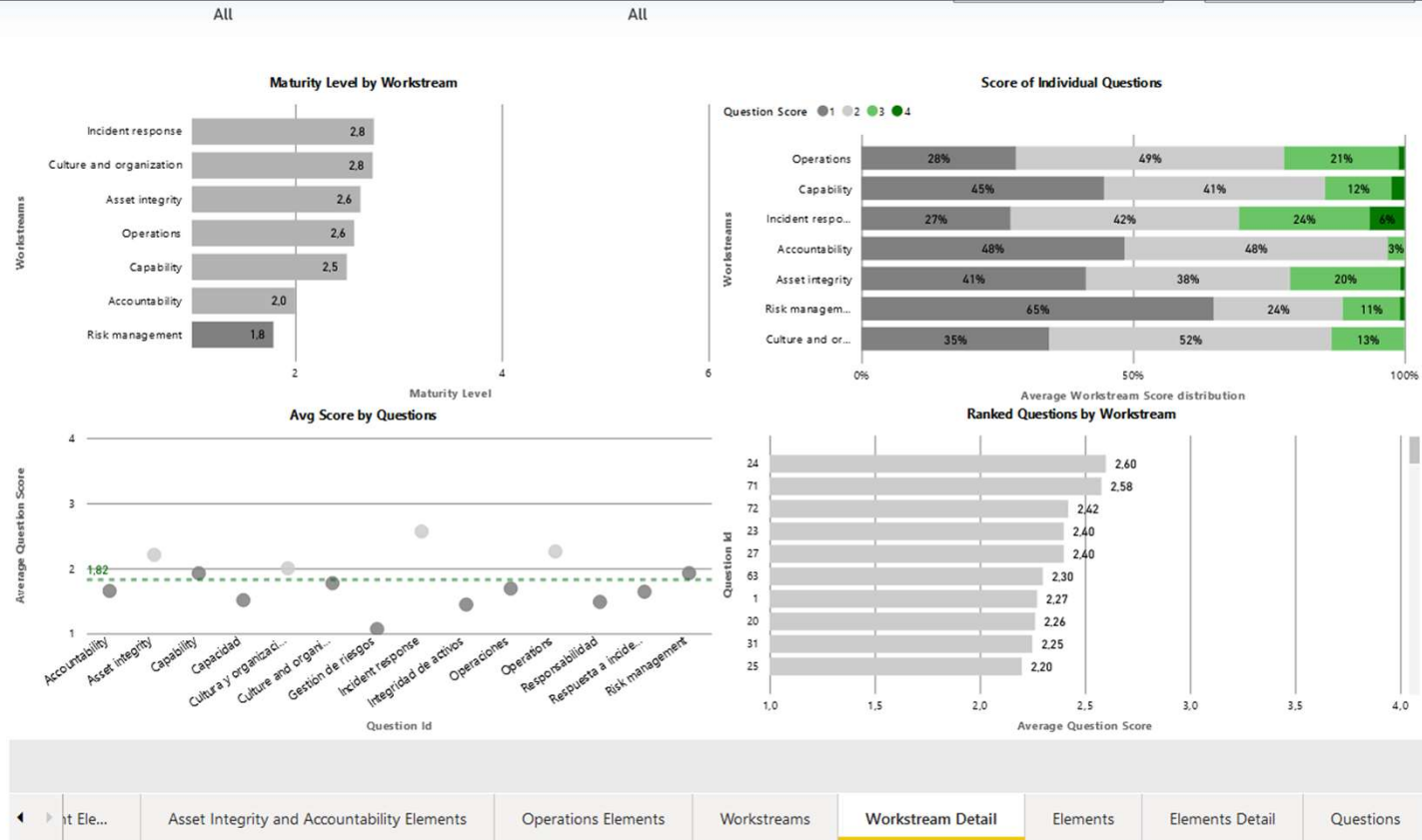






# Dynamic dashboard



- Home
- User Management
- Message Center



# Dynamic dashboard

-  Home
-  User Management
-  Message Center



**Question SWO Types and Ranks**

| QuestionText  | Promedio |
|---|----------|
| Are site personnel diligent in seeking to operate flawlessly and providing timely responses to process safety issues and concerns? (e.g. process safety-related tasks are not chronically overdue).   |          |
| Do site personnel maintain a questioning attitude to guard against complacency. Do clear expectations and enforcement of high standards regarding process safety performance exist and routinely and visibly reinforced by senior management? |          |
| Is "normalization of deviance" allowed to prevail in that abnormal/out-of-specification conditions (process/equipment related or programmatic) persist to the point of being accepted as the normal condition.                                |          |
| **Are facility personnel provided with access to relevant Process Safety program information?   |          |
| **Are personnel at all levels (including contractors, as appropriate) involved in process safety accident and near miss investigation activities?   |          |
| **Are there scheduled meetings or other formal forums to ensure periodic consultation with the above personnel in the development, review, and implementation of process safety programs? (evidence that the written program is implemented)  |          |
| **Does a written plan exist to ensure participation of all relevant personnel (including contractors working in process safety areas) in the process safety program?  |          |
| ¿Cómo autorizan los trabajos no rutinarios y se asegura la competencia del personal que los realiza?  |          |
| ¿Cómo se abordan los hallazgos de las revisiones del sistema por parte de la dirección?   |          |
| ¿Cómo se asegura el mantenimiento adecuado de los procedimientos operativos?  |          |
| ¿Cómo se asegura la aplicación efectiva del conocimiento del proceso?   |          |
| ¿Cómo se comprueba la eficacia del plan de respuesta ante emergencias?  |          |
| ¿Cómo se comunica el resultado de las investigaciones de incidentes?  |          |
| ¿Cómo se controla y revisa el éxito y mejora continua del sistema de relación con grupos de interés?  |          |
| ¿Cómo se controlan los trabajos no rutinarios?  |          |
| ¿Cómo se controlan/recompensan/abordan buenos y malos rendimientos en seguridad de contratistas?  |          |

- Asset Integrity and Accountability Elements
- Operations Elements
- Workstreams
- Workstream Detail
- Elements
- Elements Detail
- Questions



# Dynamic Risk Register

Organizations and their personnel spend immense resources on identifying hazards and analyzing risks of their assets and processes. As a result of those efforts, the resulting PHAs contain very valuable information.

Unfortunately, this information is usually locked in huge volumes of data, rarely revisited once the PHA is completed.

**Dynamic Risk Register** has been created as a tool to provide insights into PHA data, with an extremely pragmatic approach as its goal.



# Dynamic Risk Register

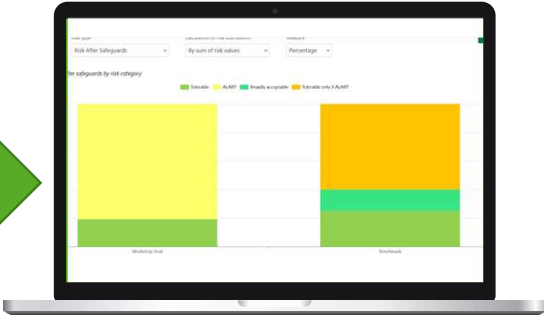
**Conventional PHAs**

The top part of the image shows the cover of a HAZOP study report titled "HAZOP STUDY REPORT FOR RAGESHWARI DEEP GAS DEVELOPMENT BRIDGE PROJECT FOR OIL, RAJASTHAN". The bottom part shows a process flow diagram with various equipment like tanks, pumps, and control valves, labeled with codes like T-001, P-001, and M-001.

**Digital PHAs**

The image shows a digital process flow diagram on a grid background. It features various process units like tanks and pumps, connected by lines representing flow streams. Some elements are highlighted with red and yellow boxes, indicating digital or interactive components.

**Dynamic Risk Register**

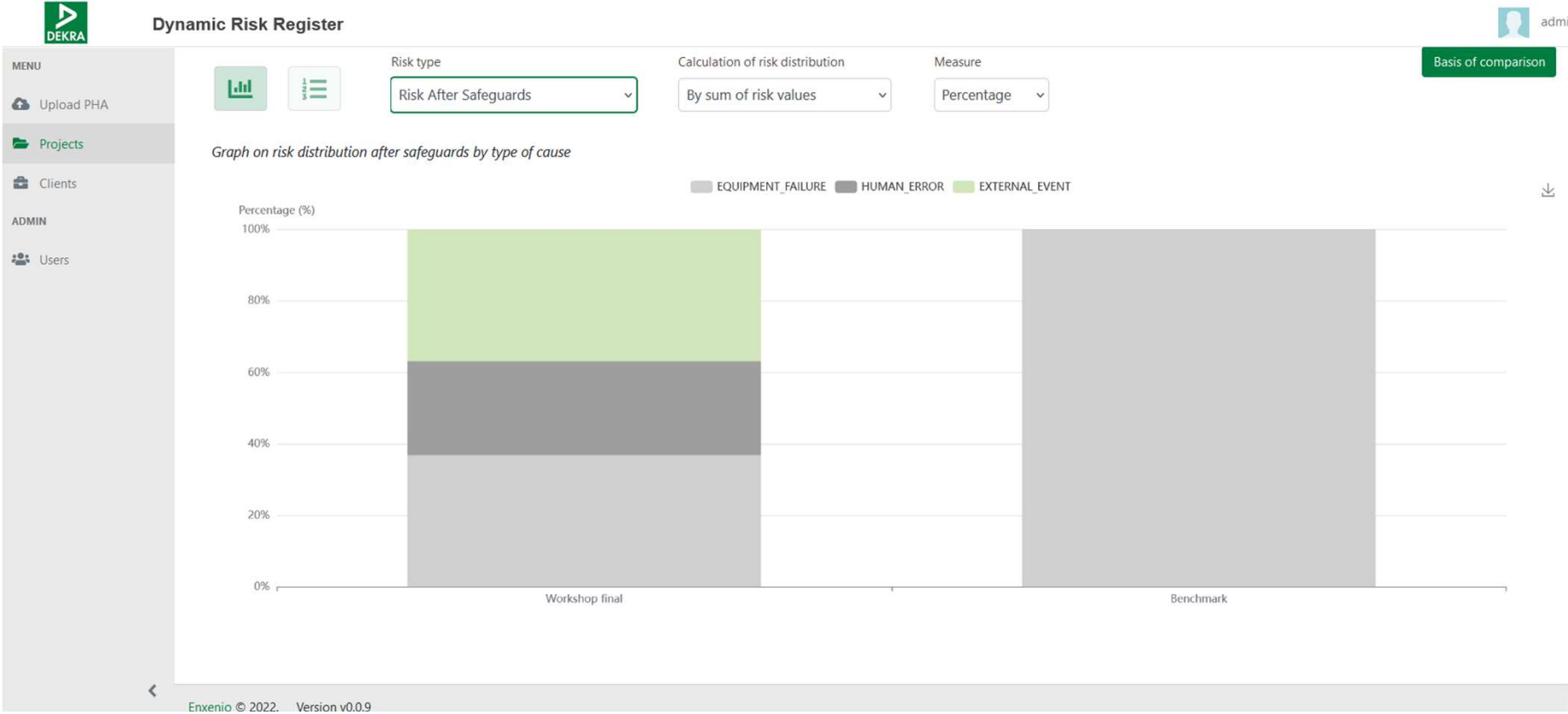




# Dynamic Risk Register



# Dynamic Risk Register



# Dynamic Risk Register

**DEKRA** **Dynamic Risk Register**

MENU

- Upload PHA
- Projects**
- Clients

ADMIN

- Users

The colour shown in every equipment of the drawing is the maximum risk before safeguards of any scenario with consequences in the equipment.

Values shown

Consequences After Safeguards

● Minor ● Serious ● Severe ● Major ● Catastrophic ● Very catastrophic

Formic acid

Methanol

R-101

Products

# Dynamic Risk Register

**Dynamic Risk Register**

Date: 22 Apr 2022  
 Operator: Demo Client  
 Facility: Demo Unit  
 Type of plant: [ ]

Baseline [v]

**Info** [x]

**Item:** BL\_L\_IN\_01  
**Type:** Liquid Source Battery Limit  
**Category:** Battery limit  
**Safeguard:** No  
**Max RBS:** 0.6  
**Value:** 0.6

**State:** Active  
 [Disable equipment]

[Hide scenarios] [Back]

| Cause   | Consequence  | RBS         | Safeguards | RAS             | Recommendations | RAR              | Bow-tie        | Timeline        |
|---|--|-------------|------------|-----------------|-----------------|------------------|----------------|-----------------|
| Supply too hot in BL_L_IN_01 during 0-Filling_up_vessel | Damage to equipment 01 due to high temperature.: Damage to asset (value between 100 kâ.- and 1 Mâ.-) | ALARP (0.6) | Saff       | ALARP (0.35)    | Recomm          | Tolerable (0.25) | [Bow-tie icon] | [Timeline icon] |
| Supply too hot in BL_L_IN_01 during 0-Filling_up_vessel | Damage to equipment 01 due to high temperature.: Damage to asset (value between 100 kâ.- and 1 Mâ.-) | ALARP (0.6) | Saff       | Tolerable (0.3) | Recomm          | Tolerable (0.25) | [Bow-tie icon] | [Timeline icon] |





Thanks for taking  
care of safety!