THESIS OVERVIEW
Who is ABS Consulting?

- Global Safety, Risk, Integrity Management and Inspection Services Company
- Serving the Oil & Gas, Petrochemical, Maritime, Power Generation, Commercial, Government and Insurance/Financial Sectors
- Corporate Headquarters in Houston. Regional HQ in Europe (UK), Middle East (UAE) and Asia (Singapore).
- Over 1,400 employees, with 40+ offices in some 30 countries
- An Affiliate of ABS (a Marine and Offshore Classification Society), founded in 1862.
Range of Services

- **Safety Management**
  - HSE Case / Program Development
  - Process Safety Assessment
  - Safety Culture Assessment
  - Management System Development
  - Safety Training

- **Risk Management**
  - Enterprise Risk Management
  - Operational Risks
  - Manmade Risks
  - Natural Hazard Risks

- **Integrity Management**
  - Project Quality Management
  - Inspection & Auditing
  - Operational Asset Integrity Management
  - Reliability & Maintenance Management
  - Independent Verification Services
Enterprise Risk Management using the THESIS BowTie™ Method
THESIS Scope

THESIS was conceived in the mid 90s as a simple, yet very powerful, “BowTie” management system tool, whereby a business could logically map out their approach to HSE management by developing credible incident scenarios and relating them to their people and procedures.

The concept and development of THESIS was, and continues to be, forged through a relationship between ABS Consulting (then EQE International) and a major international oil and gas operating company. As such the early market users were those involved in oil and gas production.

In recent years the method has grown favour with many other businesses (mining, aviation, emergency response, security, shipping, port facilities, defense, freight, finance, local government etc.) and it has become an accepted standard for risk management professionals.

With advances in software architecture, ABS Consulting has continually introduced significant advances in THESIS technology. The design of these features has resulted from global interaction with multidisciplined clients, whereby we have been able to introduce ‘best practices’ in support of their goals.
The bow-tie method originated as a technique for developing a “HSE/Safety Case,” post the Piper Alpha Incident in 1988 in which 168 lives were lost and a major UK production facility was destroyed. By linking the ‘Hazards’ and the ‘Consequences’ to an ‘Event’ it is possible to develop the relationship to include the causes, or ‘Threats,’ and the Prevention and Recovery Measures. Further understanding can be gained by examining the means by which these defenses can fail, and identifying the key components which demonstrate the integrity of these controls.

- Documents and Procedures
- Control Types and Effectiveness
- Critical Equipment and Systems
- Tasks and the persons behind the Tasks
Bow-Tie Methodology

Threats → Hazard Release → Escalation Controls → Consequences

Threat Control Measures → Recovery/Mitigation Measures

Activities & Tasks

= Critical Task
How Can We Practically use THESIS?

- High level hazard identification (hazard register) and risk assessment
- HAZID analysis – derivation of threats, consequences and controls
- GAP analysis
- Management of controls (critical and soft/non critical)
- LOPA analysis
- Derivation of tasks and procedures
- Document management system
- Shortfall and action tracking
- Focussing on personnel critical tasks
- As a complement to the safety statement/assessment, HSE case or HSEIA
- Incident investigation
- Illustrating the status and management of risk within a business to senior management, workforce and regulator
- Enterprise risk management
- As the Safety/Live Risk module within IMSIS™
industry examples

ABS Consulting have clients who use THESIS in the following sectors for management of various hazards and hazardous scenarios:

Mining
- Identification and management of underground hazards
- Above ground transportation of materials
- Health effects

Packaging and Transportation of Goods
- Assessment and management of hazardous goods
- Personal health
- Driving related hazards
- Loss of supply

Banking and Finance
- Fraud risk assessment
- Currency fluctuations
- Control of data
- Business continuity
Industry Examples

- Medicine
  - Assessment of drug treatment programs
  - Surgical error/negligence

- Shipping
  - Process safety management
  - Ship / port / berth interfaces

- Aviation (ATC, airports and carriers/operators)
  - Human error
  - Management of high level air space
  - Terminal area control (stand, taxiway, runway ops)
  - Maintenance
  - Aircraft rescue and fire fighting – tiered emergency response

- Petrochemical
  - Hydrocarbon containment losses
  - Working at height
  - Structural / marine systems failure
THESIS in-use – Reporter

- Standard suite of 50+ reports
- Preview and filtering functions
- Direct printing, Adobe, Excel or Flat Table outputs

Custom Reporter
- Same flexible functions as standard
THESIS in-use – ‘Risk Dashboard’

- **Management review of overall risks, or risk per location**
- **Sorting to order profile by category**
- **Allows a snapshot of the major exposure items**

### Overall Risk Profile

<table>
<thead>
<tr>
<th>Code</th>
<th>Hazard</th>
<th>Top Event / Impact</th>
<th>Type</th>
<th>Consequence</th>
<th>P</th>
<th>A</th>
<th>E</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-23.03</td>
<td>Sulphonic acid</td>
<td>Loss of Containment - Catastrophic Fail</td>
<td>HSE</td>
<td>Contaminated Land/Aquifer</td>
<td>E1</td>
<td>E1</td>
<td>E2</td>
<td>E1</td>
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<tr>
<td>H-22.01</td>
<td>Refined Hydrocarbons (Lube &amp; Seal Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Soil &amp; Groundwater Contamination</td>
<td>E1</td>
<td>E1</td>
<td>E2</td>
<td>E1</td>
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<tr>
<td>H-23.03</td>
<td>Sulphonic acid</td>
<td>Loss of Containment - Catastrophic Fail</td>
<td>HSE</td>
<td>Contaminated Land/Aquifer</td>
<td>E2</td>
<td>E2</td>
<td>E3</td>
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<td>H-22.01</td>
<td>Refined Hydrocarbons (Lube &amp; Seal Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Slippery Surface</td>
<td>E2</td>
<td>E2</td>
<td>E3</td>
<td>E1</td>
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<tr>
<td>H-22.01</td>
<td>Refined Hydrocarbons (Lube &amp; Seal Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Ignited Pool Fire</td>
<td>C3</td>
<td>C3</td>
<td>C1</td>
<td>C2</td>
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<tr>
<td>H-22.01</td>
<td>Refined Hydrocarbons (Lube &amp; Seal Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Ignited Oil Spilled Insulation</td>
<td>C3</td>
<td>C3</td>
<td>C1</td>
<td>C2</td>
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<tr>
<td>H-22.01</td>
<td>Refined Hydrocarbons (Lube &amp; Seal Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Machinery Enclosure Fire</td>
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<td>C3</td>
<td>C1</td>
<td>C2</td>
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<td>H-20.05</td>
<td>Toxic Gas (Chlorine)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Toxic Gas Exposure</td>
<td>A4</td>
<td>A4</td>
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<td>A1</td>
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<td>Refined Hydrocarbons (Hydraulic Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Soil &amp; Groundwater Contamination</td>
<td>E1</td>
<td>E1</td>
<td>E2</td>
<td>E1</td>
</tr>
<tr>
<td>H-20.02</td>
<td>Refined Hydrocarbons (Hydraulic Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Slippery Surface</td>
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<td>E2</td>
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<td>Refined Hydrocarbons (Hydraulic Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Ignited Pool Fire</td>
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<td>C2</td>
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<td>Refined Hydrocarbons (Hydraulic Oil)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Machinery Enclosure Fire</td>
<td>C3</td>
<td>C3</td>
<td>C1</td>
<td>C2</td>
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<tr>
<td>H-03.01</td>
<td>Other Flammable Materials (Cellulose)</td>
<td>Ignition of Material</td>
<td>HSE</td>
<td>Fire</td>
<td>C2</td>
<td>C2</td>
<td>C1</td>
<td>C2</td>
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<tr>
<td>H-03.02</td>
<td>Other Flammable Materials (Pyrophoric)</td>
<td>Iron Sulphide Exposure to Air</td>
<td>HSE</td>
<td>Autonignition &amp; SO2 Release</td>
<td>D3</td>
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<td>D1</td>
<td>D1</td>
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<tr>
<td>H-03.02</td>
<td>Other Flammable Materials (Pyrophoric)</td>
<td>Iron Sulphide Exposure to Air</td>
<td>HSE</td>
<td>Exothermic Reaction Generating High ...</td>
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<td>D1</td>
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<td>Other Flammable Materials (Morpholine)</td>
<td>Loss of Containment</td>
<td>HSE</td>
<td>Unpinned - Skin/Eye Irritation</td>
<td>A1</td>
<td>A1</td>
<td>A0</td>
<td>A0</td>
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<tr>
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<td>Loss of Containment</td>
<td>HSE</td>
<td>Unpinned - Contaminated Soil &amp; Ground ...</td>
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<td>A1</td>
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<td>Loss of Containment</td>
<td>HSE</td>
<td>Ignited - Fire</td>
<td>C3</td>
<td>C3</td>
<td>C1</td>
<td>C2</td>
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<tr>
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<td>Other Flammable Materials (Hydrogen)</td>
<td>Release From Battery During Charging</td>
<td>HSE</td>
<td>Fire</td>
<td>B2</td>
<td>B2</td>
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<td>A2</td>
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<tr>
<td>H-05.01</td>
<td>Pressure Hazards (Bottled Gases Und ...</td>
<td>Loss of Containment</td>
<td>HS</td>
<td>Cylinder Projectile &amp; Fragments</td>
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<td>E4</td>
<td>E2</td>
<td>E2</td>
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<tr>
<td>H-05.01</td>
<td>Pressure Hazards (Bottled Gases Und ...</td>
<td>Loss of Containment</td>
<td>HS</td>
<td>Contact with Pressurized Gas</td>
<td>E4</td>
<td>E4</td>
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<td>Loss of Containment</td>
<td>HS</td>
<td>Projectile</td>
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<td>C3</td>
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<tr>
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<td>HS</td>
<td>Contact With Pressurized Water</td>
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<td>A4</td>
<td>A3</td>
<td>A3</td>
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<tr>
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<td>Pressure Hazards (Non-hydrocarbon g ...</td>
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<td>HS</td>
<td>Projectile</td>
<td>C3</td>
<td>C3</td>
<td>C1</td>
<td>C2</td>
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<tr>
<td>H-05.03</td>
<td>Pressure Hazards (Non-hydrocarbon g ...</td>
<td>Loss of Containment</td>
<td>HS</td>
<td>Contact With Pressurized Gas</td>
<td>C3</td>
<td>C3</td>
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<td>C2</td>
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</tbody>
</table>
THESIS in-use – Action Tracking

- Generation of shortfalls to log deficiencies in the management system

- Create and track actions to recover shortfalls
THESIS in-use – Tree ‘Attributes’

- Threat Definition
- Barrier
- Linked Document
- Barrier Escalation
- Escalation Control
- Linked Activity/Task
- Linkage of Critical Systems
Ability to utilise the BowTie for semi-quantitative analysis:

- Initiating Event Frequency
- Enabling Factors and Modifiers
- Probabilities of Failure
- Calculation of Risk and comparison with Acceptance Criteria
Until recently, THESIS was only deployed on a PC-based platform. Whilst still perhaps the most common format, in terms of overall global usage, THESIS has uniquely been produced in a fully Web-based environment, with an SQL database.
THESIS Enterprise is now being deployed by companies with diverse operations. Examples include aviation, national and international oil and gas exploration and production and for multi-modal transport networks.

These businesses are deploying THESIS Enterprise as it allows them to manage all portfolio risks in a standardised / best practice format.

The technology allows a business to develop generic formats (as corporate best practice) and deploy the standard across all asset bases. This is a concept that businesses are continuously challenged with.

THESIS Best Practice permits:

- Deployment of corporate governance standards globally
- Consistency amongst common operations
- Easier monitoring and auditing
- Instant deployment of lessons learned and business eg. safety alerts
- Cost savings through reductions in replicated learnings / consulting
THESIS Developments (Enterprise)

Parent files are created and deployed to Assets / Business Units as ‘Children’ Bow-Ties eg. Asset A, Asset B……Asset n. Local Deviations are permitted for specific local circumstances if necessary.

eg. New Control cascaded

eg. Threat hidden on Asset A

‘Cascading’ of data is managed from the ‘Parent.’ As THESIS is Web based, the assets (‘Children’) can be located globally. The ‘Child’ is free to make bespoke changes in accordance with the chosen rules.
Other Key THESIS Attributes

- Configurable auto e-mail engine – particularly useful for action tracking
- Multi language sets
- Search and replace functions
- Ability to upload and download data in Excel spreadsheet formats
- Pre-defined HAZID templates and guided lookups
- Portable BowTie functionality
  - Easily the most successful/popular and market driving feature to date, whereby users can create interactive ‘HTML’ or ‘Flash Media’ case files for use by non-THESIS users eg. Contractors / Consultants / Regulators / Corporate Intranet sites
  - Also reduces the amount of paper based outputs – useful in remote sites and for submission of electronic ‘Safety Cases’

- Integration with independent verification management (ABS Consulting IMSISTM- TIMS)
  - Linkage with the SCE development, notation, calculation, scheme and performance standards module of IMSISTM.

- Integration with integrity management tools (ABS Consulting IMSISTM)
  - Linkage with the full suite of IM tools for calculation and representation of ‘Live Facility Risk Profiles.’
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