COURSE OVERVIEW HE1893
Causal Reasoning Investigation

Course Title
Causal Reasoning Investigation

Course Date/Venue
October 20-24, 2024/SAS Meeting Room, Holiday Inn Muscat al Seeb, an IHG Hotel, Muscat, Oman

Course Reference
HE1893

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Causal Reasoning Investigation. It covers the principles and methodologies used in causal investigation focusing on logic, evidence gathering and hypothesis testing; the different types of causes and the various causal models and frameworks used to structure investigations; and the steps for initiating a causal reasoning investigation, address ethical considerations in investigations and recognizing and mitigating biases in causal reasoning.

Further, the course will also discuss the data collection strategies, analyzing data for causalities and using technology in investigations; developing and prioritizing hypotheses based on available data and causal reasoning principles; the methods for testing hypotheses through experiments, simulations or further data analysis; the best practices for documenting investigative findings, analyses and the rationale behind identified causes; creating and using fishbone diagrams (Ishikawa) for identifying potential causes of a problem; and constructing and analyzing fault trees to identify root causes and contributing factors of failures or events.

During this interactive course, participants will learn the Bow-Tie analysis, comparative analysis techniques and scenario analysis; the causality in complex systems including systemic interactions and emergent behaviors; the counterfactual reasoning and its application in understanding how different actions might have changed outcomes; investigating human factors and organizational behaviors as causes in events including error analysis and cultural assessments; the legal and regulatory implications of causal findings including liability and compliance issues; using causal reasoning for predictive purposes including risk assessment and prevention strategies; designing an investigation plan that efficiently leads to identifying root causes and contributing factors; the appropriate strategies for communicating investigation findings effectively to different audiences including report writing and presentation skills; translating investigation findings into actionable corrective and preventive measures; the procedures for monitoring the effectiveness of implemented actions and conducting follow-up investigations if necessary; and developing individual and team skills in causal reasoning and investigation.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on casual reasoning investigation
- Discuss causal reasoning concepts including the principles and methodologies used in causal investigation focusing on logic, evidence gathering and hypothesis testing
- Identify the different types of causes as well as the various causal models and frameworks used to structure investigations
- Implement steps for initiating a causal reasoning investigation, address ethical considerations in investigations and recognize and mitigate biases in causal reasoning
- Carryout data collection strategies, analyzing data for causalities and using technology in investigations
- Develop and prioritize hypotheses based on available data and causal reasoning principles
- Establish methods for testing hypotheses through experiments, simulations or further data analysis
- Apply best practices for documenting investigative findings, analyses and the rationale behind identified causes
- Create and use fishbone diagrams (Ishikawa) for identifying potential causes of a problem
- Construct and analyze fault trees to identify root causes and contributing factors of failures or events
- Apply Bow-Tie analysis, comparative analysis techniques and scenario analysis
- Recognize causality in complex systems including systemic interactions and emergent behaviors
- Explore counterfactual reasoning and its application in understanding how different actions might have changed outcomes

- Investigate human factors and organizational behaviors as causes in events including error analysis and cultural assessments
- Recognize the legal and regulatory implications of causal findings including liability and compliance issues
- Use causal reasoning for predictive purposes including risk assessment and prevention strategies
- Design an investigation plan that efficiently leads to identifying root causes and contributing factors
- Employ appropriate strategies for communicating investigation findings effectively to different audiences including report writing and presentation skills
- Translate investigation findings into actionable corrective and preventive measures
- Establish procedures for monitoring the effectiveness of implemented actions and conducting follow-up investigations if necessary
- Develop individual and team skills in causal reasoning and investigation

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspect and considerations of causal reasoning investigation for those who are responsible for others in the workplace such as managers, engineers, supervisors, team leaders, foremen and junior production operation staff. Further, the course is suitable for all HSE, fire and safety staff.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Attalla Ersan, PEng, MSc, BSc, is a **Senior Engineer** with over **35 years** of extensive experience within the Project Safety **Oil & Gas**, **Hydrocarbon** and **Petrochemical** industries. His expertise widely covers the areas of **HAZOP** Facilitation, **Hazardous Materials**, **Material Safety Data Sheets** (**MSDS**), **Hazardous Wastes**, **Hazards of Chemical Incidents**, **Shipping Configurations**, **Respiratory Protection**, **Protective Clothing**, **Donning and Doffing Procedures**, **Boiler & Steam System** Management, **Waste Heat Recovery**, **Boiler Plant Safety**, **Boiler Controls**, **Steam Distribution** Systems, **Steam Traps**, Pollution Control, Cracked **Gas Compressor**, **Reboilers**, **Sulphur Unit Air Blower**, **Steam Turbine**, **Distillation Columns**, **Gas Treatment**, **Waste & Water Treatment Units**, **Process Plant** Operations, **Process Plant Startup & Operating Procedure**, **Ethylene & Vinyl Chloride**, **Ethane Cracking Furnaces** Operations, **Ethylene & Polyethylene** Operation, **Acid Gas Treatment**, **Sulphur Recovery**, **EDC & VCM**, Caustic Soda Storage, Debottle-necking, **Loss Prevention**, **Process Operation**, **Safety Audits**, **Process Engineering**, **Root Cause Investigations**, **Pyrolysis Cracking**, **Gas Plant Commissioning**, **Loss Prevention Techniques**, **Occupational Hazards**, Hot Tapping & Tie-Ins, Pre-Start-Up Safety Review (**PSSR**), Standard Operating Procedure (**SOP**), Emergency Operating Procedure (**EOP**), Permit to Work Systems (**PTW**), Hazard and Operability (**HAZOP**) Study, Process Hazards Analysis (**PHA**), Consequence Analysis Application, **Gas Detectors** Operation, **Accident/Incident Investigation (Why Tree Method)**, **Occupational Exposure Assessment**, **Fire Fighting & First Aid**, **Environmental Management**, **Basic Safety** Awareness, **Steam Cracking**, **Steam Generation**, **Binary Fractionators** Operations, **Tanks Farm & Metering Station Techniques**, **Gas Treatment**, **Sulphur Recovery Process Unit Operation**, **Permit to Work System** and **Emergency Response Planning**. Further, he is also well-versed in Project Management, Human Resources Consultancy, Manpower Planning, Job Design & Evaluation, Recruitment, Training & Development and Leadership, Creative Problem Solving Skills, Work Ethic, Job Analysis Evaluation, Training & Development Needs, Bidding & Tendering, Technical Report Writing, Supervisory Leadership, Effective Communication Skills and Total Quality Management (TQM). He is currently the **CEO** of **Ersan Petrokimya Teknoloji Company Limited** wherein he is responsible for the design and operation of Biogas Process Plants.

During his career life, Mr. Ersan has gained his practical and field experience through his various significant positions and dedication as the **Policy**, **Organization & Manpower Development Head**, **Training & Development**, **Head**, **Ethylene Plant – Pyrolysis Furnace Engineer**, **Production Engineer**, Process Training Coordinator, Ethylene Plant Shift Supervisor, Ethylene Plant Panel & Fit Operator, Process Training & Development Coordinator, **Technical Consultant**, and **Instructor/Trainer** for Qatar Vinyl Company Limited and Qatar Petroleum Company (QAPCO).

Mr. Ersan is a **Registered Professional Engineer** and has a **Master's degree** of **Education** in **Educational Training & Leadership** and a **Bachelor's degree** of **Petrochemical Engineering**. Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, workshops, conferences and seminars internationally.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: Sunday, 20th of October 2024

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Foundations of Causal Reasoning:*** *Causal Reasoning Concepts including the Difference Between Correlation & Causation*
0900 - 0915	*Break*
0915 – 0945	***Principles of Causal Investigation:*** *The Principles & Methodologies Used in Causal Investigation Focusing on Logic, Evidence Gathering & Hypothesis Testing*
0945 – 1115	***Types of Causes:*** *Different Types of Causes (Immediate, Contributing, Root Causes) & Their Significance in Investigations*
1115 – 1215	***Causal Models:*** *Various Causal Models & Frameworks Used to Structure Investigations such as Fishbone Diagrams, Fault Tree Analysis & Bow-Tie Diagrams*
1215 – 1230	*Break*
1230 – 1330	***Setting Up an Investigation:*** *Steps for Initiating a Causal Reasoning Investigation including Defining the Problem, Setting Objectives & Assembling an Investigation Team*
1330 – 1420	***Ethical Considerations & Bias:*** *Addressing Ethical Considerations in Investigations & Recognizing & Mitigating Biases in Causal Reasoning*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: Monday, 21st of October 2024

0730 – 0830	***Data Collection Strategies:*** *Techniques for Collecting Data & Evidence that are Relevant to the Investigation including Interviews, Document Reviews & Site Inspections*
0830 – 0930	***Analyzing Data for Causality:*** *Methods for Analyzing Collected Data to Identify Patterns, Anomalies & Potential Causes*
0930 – 0945	*Break*
0945 – 1100	***Using Technology in Investigations:*** *Software & Technology Tools that can Aid in Data Collection, Analysis & Visualization of Causal Relationships*
1100 – 1215	***Developing Hypotheses:*** *How to Develop & Prioritize Hypotheses Based on Available Data & Causal Reasoning Principles*
1215 – 1230	*Break*
1230 – 1330	***Testing Hypotheses:*** *Methods for Testing Hypotheses through Experiments, Simulations or Further Data Analysis*
1330 – 1420	***Documenting Findings:*** *Best Practices for Documenting Investigative Findings, Analyses & the Rationale Behind Identified Causes*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: Tuesday, 22nd of October 2024

0730 – 0830	***Fishbone Diagrams (Ishikawa):*** *How to Create & Use Fishbone Diagrams for Identifying Potential Causes of a Problem*
0830 – 0930	***Fault Tree Analysis (FTA):*** *How to Construct & Analyze Fault Trees to Identify Root Causes & Contributing Factors of Failures or Events*
0930 – 0945	*Break*
0945 – 1100	***Bow-Tie Analysis:*** *Bow-Tie Method for Visualizing Causal Pathways from Causes to Effects & Implementing Control Measures*
1100 – 1215	***Comparative Analysis Techniques:*** *Techniques for Comparing Events or Issues with Similar Scenarios to Identify Common Causes & Contributing Factors*
1215 – 1230	*Break*
1230 – 1330	***Scenario Analysis:*** *Using Scenario Analysis to Explore Different Causal Chains & their Potential Outcomes*
1330 – 1420	***Workshop: Applying Causal Models:*** *Participants Engage in Workshops Applying Causal Models to Hypothetical or Real-World Cases*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: Wednesday, 23rd of October 2024

0730 – 0830	***Systemic Causality in Complex Systems:*** *Understanding Causality in Complex Systems including Systemic Interactions and Emergent Behaviors*
0830 – 0930	***Counterfactual Reasoning:*** *Counterfactual Reasoning & Its Application in Understanding How Different Actions Might have Changed Outcomes*
0930 – 0945	*Break*
0945 – 1100	***Causality in Human Factors & Organizational Behavior:*** *Investigating Human Factors & Organizational Behaviors as Causes in Events including Error Analysis & Cultural Assessments*
1100 – 1215	***Legal & Regulatory Implications:*** *The legal & Regulatory Implications of Causal Findings including Liability & Compliance Issues*
1215 – 1230	*Break*
1230 – 1330	***Predictive Causality:*** *Using Causal Reasoning for Predictive Purposes including Risk Assessment & Prevention Strategies*
1330 – 1420	***Case Study Analysis:*** *Group Analysis of Complex Case Studies Focusing on Applying Advanced Causal Reasoning Techniques*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

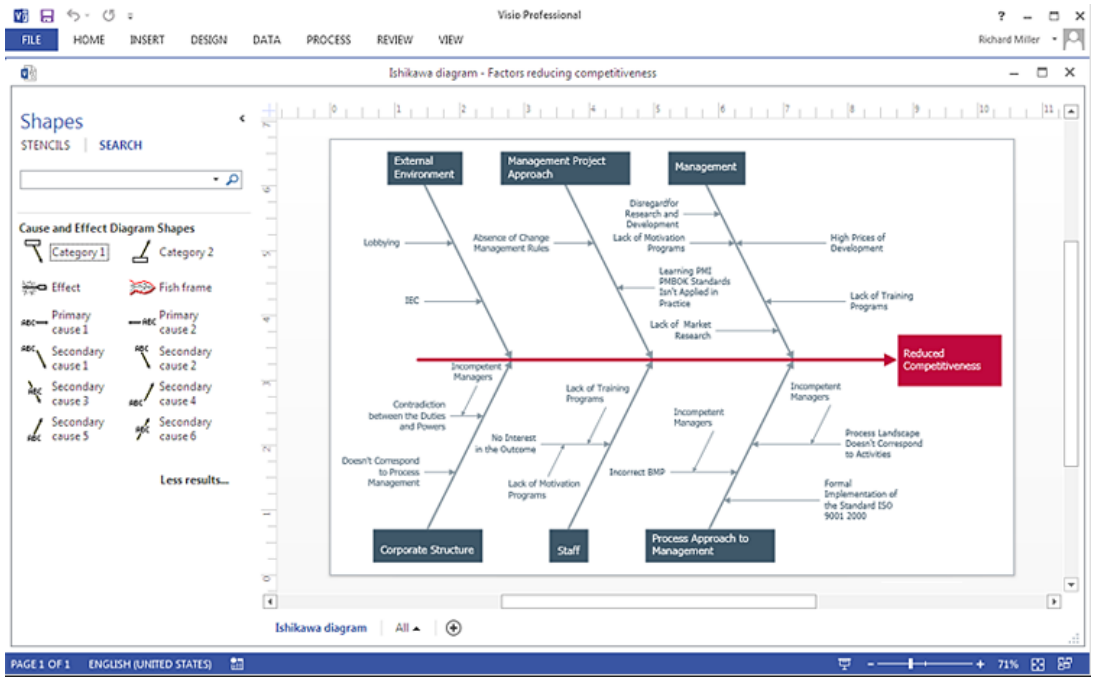
Day 5: Thursday, 24th of October 2024

0730 – 0815	***Designing Effective Investigation Plans:*** *How to Design an Investigation Plan that Efficiently Leads to Identifying Root Causes & Contributing Factors*
0815 – 0900	***Communication & Reporting Results:*** *Strategies for Communicating Investigation Findings Effectively to Different Audiences including Report Writing & Presentation Skills*
0900 – 0915	*Break*
0915 – 1100	***Implementing Corrective & Preventive Actions:*** *Translating Investigation Findings into Actionable Corrective & Preventive Measures*
1100 – 1230	***Monitoring & Follow-up:*** *Establishing Procedures for Monitoring the Effectiveness of Implemented Actions & Conducting Follow-Up Investigations if Necessary*

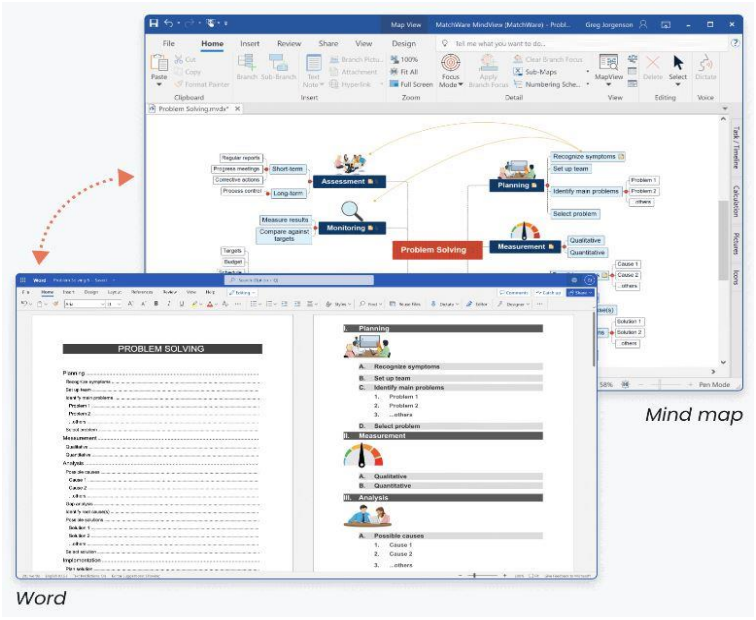
1230 – 1245	*Break*
1245 – 1345	***Developing Causal Reasoning Skills:*** *Exercises & Strategies for Further Developing Individual & Team Skills in Causal Reasoning & Investigation*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

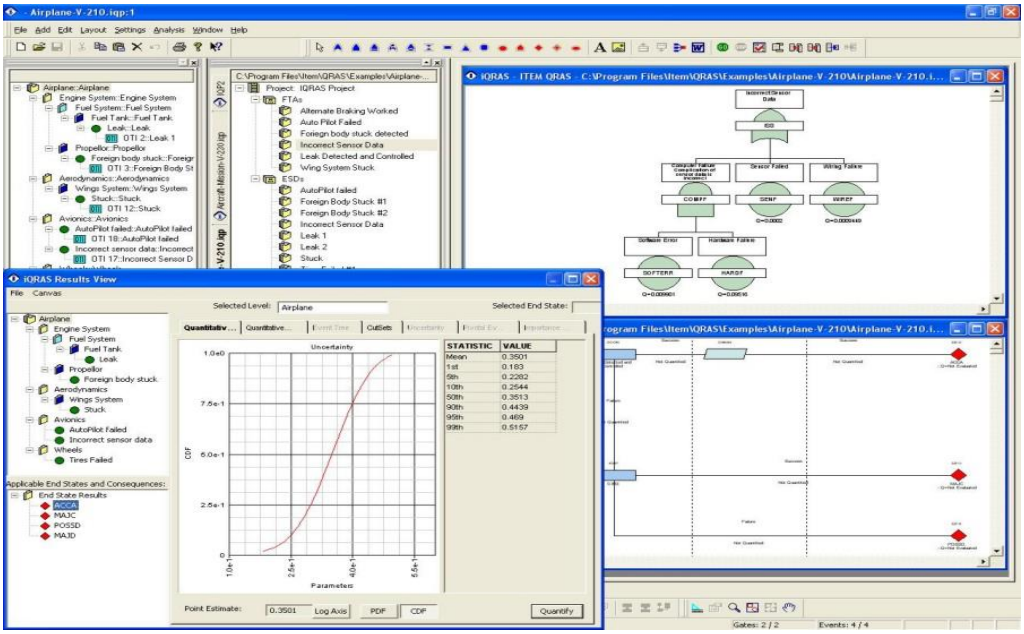
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators "Visio Software", "Mindview Software" and "QRA".



Visio Software



Mindview Software



QRA System Simulator

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org