Meeting the challenges of a safety-driven organisation

Safety Engineering Conference – Feb 9th 2016
Steve Lewis & Gareth Ellor - Directors
Agenda

1. Introduction to Risktec
2. Key challenges for a safety driven organisation
3. Case Studies – a few ideas & solutions
4. Q&A
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Risktec Solutions

- Independent and specialist risk management consulting and training provider
- Part of the TÜV Rheinland Group
- We focus on:
  - Safety & risk assessment *(what are the risks?)*
  - Management systems *(how are they managed?)*
  - Culture & behaviour *(what really happens!)*
  - Training & education *(knowledge transfer)*
  - Resource solutions *(specialist, flexible support)*
- 260+ employees across 16 offices worldwide
- 100 associates embedded in client organisations
- …working in 7 diverse market sectors
- …delivered over 4,200 projects to over 1,000 clients in over 50 countries
- …providing solutions (no two assignments are the same!)
Postgraduate Modules in Risk & Safety Management

**Core Module**
- Introduction to Risk Management

**Research Methods**
- Research Methods in Risk & Safety Mgmt

**MSc Project**
- Project

**Management Systems and Culture**
- Health, Safety & Environment (HSE) Mgmt Systems
- Safety/HSE Cases

**Risk Assessment and Treatment**

- Hazard Identification
- Risk Analysis
- Risk Reduction & ALARP
- HAZOP Study
- Bowtie Risk Management
- Fault Tree & Event Tree Analysis
- Functional Safety (including SIL)
- Availability, Reliability & Maintainability (ARM)
- Physical Effects Modelling
- Human Factors in Design & Operations
- Environmental Risk Assessment
- Process Safety Mgmt in Design & Operations
- Process Hazard Analysis
- Engineered Risk Control Systems & Perf (Oil & Gas)
- Engineered Risk Control Systems & Perf (Nuclear)
- Oil & Gas Lifecycle Hazards & Risks
- Oil & Gas & Process Industry Risk Studies
- Oil & Gas & Process Industry QRA
- Asset Integrity Risk Management
- Offshore Wind Farm Safety Assurance & Justification
- Asset Integrity
- Nuclear Lifecycle Hazards & Risks
- Nuclear PSA
- Rail Industry Hazards & Risks
- Rail Safety Analysis
- Rail Risk Management
- Maritime Risk Management

**Module key:**
- Cross-industry
- Oil & Gas & Process
- Rail
- Nuclear
- Marine
- Renewables

**Other Training Courses**

For details of our accredited maritime safety and security officer modules please visit www.intmarsec.co.uk

- Leadership
- Software
- Nuclear Foundation Modules
- HSSE Leadership for Managers
- BowTieXP Software (Basic and Advanced)
- HSSE Risk Management for Managers
- Investigator 3 Software
- HSSE Leadership for Supervisors
- Project Risk Management
- Implementing a Regulatory Regime
- Nuclear Reactor Basics
- Radiological Protection
- Nuclear Reactor Safety Principles
- Radioactive Waste Management
- Principles of Regulatory Systems
- Safety and Security
Risk Reduction

- Engineering Risk Reduction
- Management System Improvements
- Improved Leadership, Culture and Behaviours

Time
Thales

- Safety and Assurance for Jubilee and Northern Line Upgrade Project (JNUP)
- Safety Cases for Neasden Depot
- Safety Cases for Train Protect & Warning System (TPWS) for Network Rail
- Safety Assessment for the Manchester Metrolink Project
- Safety Case for the Train Management System (TMS) Project for Network Rail
- Safety and Assurance for London Underground Four Lines (Signalling) Modification Project (4LM)
- Submarine Periscope System Safety Support Thales Optronics Glasgow
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Déjà vu

How do we effectively integrate safety in design?

How can we give our safety engineers practical tools to do this?

How do we bring our Safety Case to life?

How do we capture knowledge of ageing workforce?

How do we implement training effectively across our organisation?

How do we make learning stick?
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A few ideas & solutions
A shared goal?
Why integrate safety in design

1. To get things right.
2. To reduce risks ALARP

- **Eliminate**: Remove the hazard all together or substitute for a less hazardous alternative
- **Reduce**: Volume, inventory, concentration, speed, voltage, etc.
- **Isolate**: Move further away, enclose, circuit breakers, guards, isolation valves, lock-out-tag-out, etc.
- **Control**: Work procedures, safety systems, alarms, trips, interlocks, limit switches, permit to work
- **PPE**: Personal Protection Equipment
- **Discipline**: Training, supervision, instruction, information, awareness of incidents, safety meetings, disciplinary process

Always try to think beyond this most obvious, but least effective level of control.
Why integrate safety in design

1. To get things right.
2. To reduce risks ALARP.
3. To reduce costs!

Changes are also cheaper and easier early on.

Managing residual risk

Potential to reduce risk

Location

Concepts & options
Project schedule
Contractor selection
Layouts
Design
Specifications
O&M philosophies

Management Systems
- QHSSE
- Asset management
- O&M
- Competency

Time

Licensing
Planning
Design & Construction
Commissioning, Operations & Maintenance
Life Extension/Decommissioning

Planning
Concepts & options
Layouts
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Design
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Construction
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Life Extension/Decommissioning

Commissioning, Operations & Maintenance
Life Extension/Decommissioning

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Life Extension/Decommissioning

Life Extension/Decommissioning
Design v Ops v Safety Case Study: Nuclear Defence
Success Factors

1. It’s a juggling act! “Negotiate” between the three elements to find the optimum overall compromise!

2. Ensure all three elements remain in harmony at all times.
Success Factors

1. It’s a juggling act! “Negotiate” between the three elements to find the optimum overall compromise!

2. Ensure all three elements remain in harmony at all times.

3. Start early! A truly ALARP solution can only be reached if integration starts from concept design.
A few ideas & solutions

Déjà vu

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Case Study: Siemens Offshore Wind Safety Case Framework

Project Life-Cycle

- Concept/Development
- Design

Product Life-Cycle

- Concept/Development
- Design
- Production/Manufacture
- Works Testing

Logistics

- Site Construction & Commissioning
- Operation & Maintenance
- Decommissioning/Re-Powering
- Recycling/Disposal

TUVRheinland Risktec
Case Study: Siemens Offshore Wind Safety Case Framework

- Identify Hazards
- Generate Hazard Register
- Develop Risk Scenarios
- Screen Significant Hazards
- Are risks ALARP?
  - Yes: Implement further risk reduction measures
  - No: Perform detailed Risk Assessment on Significant Hazards
- Capture/Record Position

Hypothetical Wind Farm: Full Life-Cycle
- Project
- Product
- Logistics

Toolkit:
- Policies
- Procedures
- Templates
- Worked Examples

Apply to specific Project, Product or Logistics
Case Study: Siemens Offshore Wind Safety Case Framework

**Product** (e.g. Wind Turbine, Offshore Platform)
- Generates: Generic Product Safety Case
- Demonstrates: all (or selected) Product design, construction, operation etc. risks are reduced ALARP on a generic basis (not location specific)

**Project** (e.g. Specific Wind Farm)
- Generates: Wind Farm Safety Case
- Demonstrates that a specific Wind Farm is designed and can be constructed, operated, maintained and decommissioned safely and that all risks are reduced ALARP

**Logistics** (e.g. Marine Operations, Aviation)
- Generates: Generic Logistics Safety Case
- Demonstrates: all (or selected) Offshore Wind Logistics risks are reduced ALARP on a generic basis (not location specific)

**Safety Case Framework**
- Safety Case Procedure
- Safety Case Toolkit
Case Study: Siemens Offshore Wind Safety Case Framework

1. Framework ensures and demonstrates that they are managing risk effectively internally, to customers and the regulator.

2. Ensures a complete and thorough approach – thinking done up-front (once!) involving all the right people.

3. Provides a blueprint and template for specific projects ensuring consistent approach.

4. Reduces cost; majority of work done up-front - application limited to project specific tailoring.

5. Captures experience and lessons learned centrally providing a live basis of safety.

6. Approach applicable to any replicated project.
A few ideas & solutions

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How do we bring our Safety Case to life?
Do you know what could go wrong?

Have you got systems in place to prevent this from happening?

Can you assure yourself that they are working effectively?
Bow-Tie Methodology

Visually demonstrate and communicate the link between controls and the management system

HSE Critical Activities

Responsible parties
Benefits of Bow-Tie

- Improved understanding
- Greater ownership
- Efficiency gains
- Live “Basis of Safety”
Where does it fit in?

We know what could go wrong?

We have systems in place to prevent this from happening?

We can assure ourselves that they are working effectively?

We have systems in place to prevent this from happening?

Are risks ALARP?

Identify Hazards
Generate Hazard Register
Develop Risk Scenarios
Screen Significant Hazards
Generate Bowtie Diagrams for Significant Hazards

Implement further risk reduction measures

Yes

No

Identify Safety Critical Equipment
Inspect, Maintain, Test etc.
Define Roles & Responsibilities
Monitor, Review, Audit etc.

Screen Significant Hazards

We can assure ourselves that they are working effectively?
Déjà vu

A few ideas & solutions

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How do we capture knowledge of ageing workforce?
Ageing Western Workforce

United Kingdom, 2014, source www.ons.gov.uk

Disproportionate number of experienced and skilled workers retiring in next 5-10 years => specific strategies required for knowledge transfer
Case study: Rolls-Royce Submarines

**Problem:** How to capture safety knowledge of mature safety engineers and pass on to new younger safety engineers?

**Solution:** Customised MSc in Risk and Safety Management

### Activity

- **Course content**
  - Selection and review of modules
  - Signposts to RR standards and practices
  - Case studies specific to RR

- **Course delivery & assessment**
  - Coaching support to trainees

- **Post-course**
  - On-the-job coaching and mentoring
Benefits

- 100% success rate (2 passes, 3 merits, 11 distinctions)
- Course materials captured company knowledge in structured programme
- Trainees able to relate theory to practical applications of day job
- Subsequent performance reviews revealed trainees outperformed peers in day job
Déjà vu

A few ideas & solutions

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Methods of Delivery & Assessment

**Audience**
- Smaller groups
- Larger groups
- All employees

**Delivery**
- More classroom based
- More online or CBT

**Assessment**
- Essay & dissertation
- Trainer observation
- Multiple choice
- Tracking of participation
Case Study: Talisman-SINOPEC Energy UK

**Problem:** How to make 4,000 workers aware of importance of new Risk Assessment Matrix and how to help 250 supervisors use it correctly?

**Solution:** Blended learning (online + classroom)

- **Online 1 hour awareness training for 4,000 workers** (client secure area on Risktec Online)
- **Classroom 1 day training for 250 supervisors in groups of 20**, with individual and group activities
- Testing by multiple choice questions
Benefits

- Different audiences get:
  - right message for them
  - appropriate delivery method
  - appropriate level of assessment to confirm message understood

- Very cost-effective

- More consistent risk assessment and decision-making in workplace
A few ideas & solutions

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GAME BASED LEARNING

A NEW TAKE ON TRAINING | MAKING LEARNING LAST LONGER

INTERACTIVE | EFFECTIVE | FUN

TEAM BASED

30-60 MINS

AGE 2-102
Q: WHAT HAPPENS WHEN TRAINEES APPLY THEIR PROBLEM SOLVING ABILITY TO GAMES WHICH REFLECT THE KEY CHALLENGES IN BUSINESS?

A: YOUR WORKFORCE DEVELOPS A PERSONAL UNDERSTANDING OF THE SUBJECT AND HAVE HIGHER RETENTION RATE OF THE LEARNING OBJECTIVE.

PEOPLE GENERALLY REMEMBER...

10% OF WHAT THEY READ
20% OF WHAT THEY HEAR
30% OF WHAT THEY SEE
50% OF WHAT THEY SEE AND HEAR
70% OF WHAT THEY SAY AND WRITE
90% OF WHAT THEY DO (SIMULATE, MODEL, OR EXPERIENCE A LESSON; DESIGN/PERFORM A PRESENTATION - “DO THE REAL THING”)

For Grown-Ups: Game based learning takes the concepts you wish to communicate out of power point and places them tangibly in front of the trainee. The games re-infuse the learning by using an analogy to bring a traditionally technical subject and ground it in the real world – making the training accessible to all personnel across an organisation. Through the game cause and effect can be played out in a safe environment allowing an appreciation of the analogy would apply to everyday operations. By providing an interactive, fun, hands on experience research indicates retention of the learning outcomes are higher versus traditional methods as found by Edgar Dale’s research and development of his “Cone of Experience”.
“Operating equipment before understanding the safety critical aspects of operation and before verifying the safety critical ‘lines of defence’ are in place and functional”.
TIPPING POINT

CAN YOU AVOID COLLAPSE?

TEAM BASED

30-60 MINS

AGE 2-102
Everyday operational issues can be tough on your barriers against failure. Put your judgement and technical skills to the test to manage your facility and keep it from collapse.

For Grown Ups – This game illustrates the concept of Defence in Depth against Major Accident Hazards through a barrier analogy. The players will be given scenarios that will necessitate the loss of safety barriers and gain a tangible understanding of the effects eroding these have on the stability and integrity of operations.
Example games

**THEME 2**
“Functional Safety Critical Equipment”

“Starting or operating equipment when safety critical instrumentation is bypassed, out of calibration or out of service”.
Can you fly without...?
SAFETY CRITICAL ELEMENTS

SPEC YOUR OWN PRIVATE JET FOR THE HOLIDAY OF A LIFETIME!

A lottery win means you can afford it all — disco, pool table, the works… but when reality bites can you afford what you really need to fly at all?

For Grown Ups – This game illustrates the concept of safety critical elements in the context of an aeroplane’s systems. The players will have to use their judgement to identify those components available for selection which are key to the safety of the flight. This mirrors the identification and justification of safety critical elements essential to the prevention, control and mitigation of Major Accident Hazards.
1. A novel, engaging mechanism for learning.
2. Significantly improved knowledge retention rates.
3. Increases impact of training by linking a fun activity to a serious issue or concept – makes it enjoyable and memorable.
4. Refreshing alternative to conventional training.
5. Readily tailored to suit different issues/concepts - can easily link issue/concept to a game either literally or metaphorically.
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Questions
Thank you for your attention