Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related, Risks
iNTeg-Risk
Grant agreement number: CP-IP 213345-2

iNTeg-Risk: Early Recognition, Monitoring and Integrated Management of Emerging, New Technology Related Risks

iNTeg-Risk Kick-off Meetin
Emerging Risks and HSE

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Health and Safet
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HSE / HSL CAPABILITIES

Occupational & Environmental Health

Risk Assessment

Work Environment

Engineering

Field Scientific Support

Fire, Explosions & Process Safety

Behavioural & Social Sciences

Specialist Photographic & Graphics Services

INTRODUCTION

- UK Regulators
  - **Health** and **Safety** Executive: Risk assessment, technical risk reduction, guidance, inspection, ATEX, Pressure Equipment Directive, …
  - **Environment** Agency and Scottish Environmental Protection Agency: Environmental impact assessment, Integrated pollution prevention and control
  - **Local Authorities**: Planning permission

- Other Government departments and responsibilities
  - Trade
  - Industry
  - Employment
  - Finance

TYPES OF RISK ASSESSMENT

Safety risk and health risk are different

- Safety risk is based on events
- Health risk is based on exposure (concentration and time)

Risk assessment should take account of both:

- Severity / consequence
- Probability / likelihood / frequency

FUNDAMENTAL QUESTIONS

1. What?

Hazard identification

2. How bad?

Severity

3. How often?

Frequency

4. So what?

Risk Assessment

HAZARD IDENTIFICATION

- Team-based
- Suggestions from outside the immediate design team
- Brainstorming
- Needs structured approach:
  - Hazard and Operability Study (HAZOP),
  - Failure Mode Effect Analysis (FMEA),
  - ‘What if’ studies
  - Top down – from final consequences
  - Bottom up – from initial causes

SIX STAGE HAZARD ID STUDY

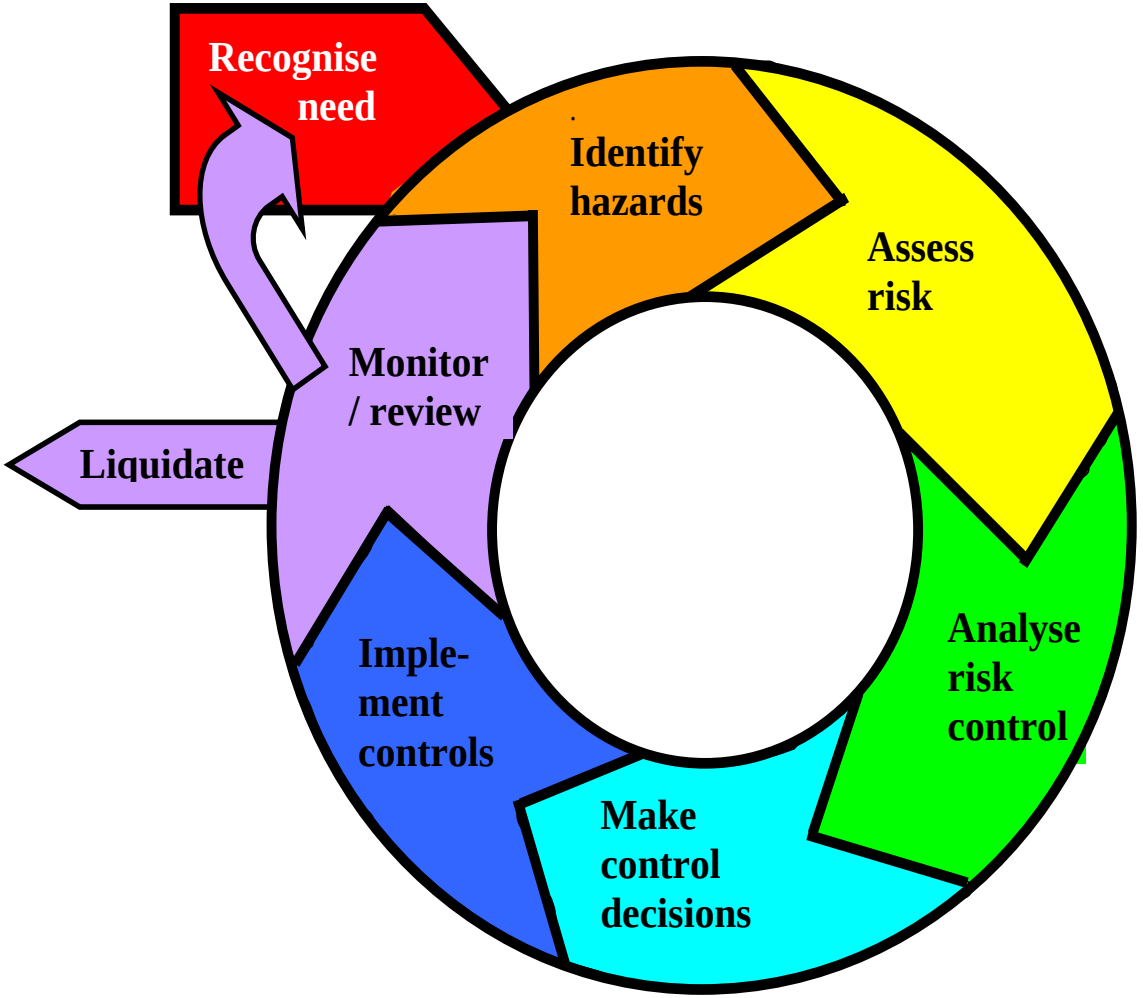
Originally developed by UK Chemical Industry:

1. Inherent safety of concept design
2. Top down study using keywords at design flowsheet stage
3. HAZOP of piping and instrumentation diagram
4. Check actions complete before commissioning
5. Inspect plant before commissioning
6. Follow up when plant operating

(7. Decommissioning)

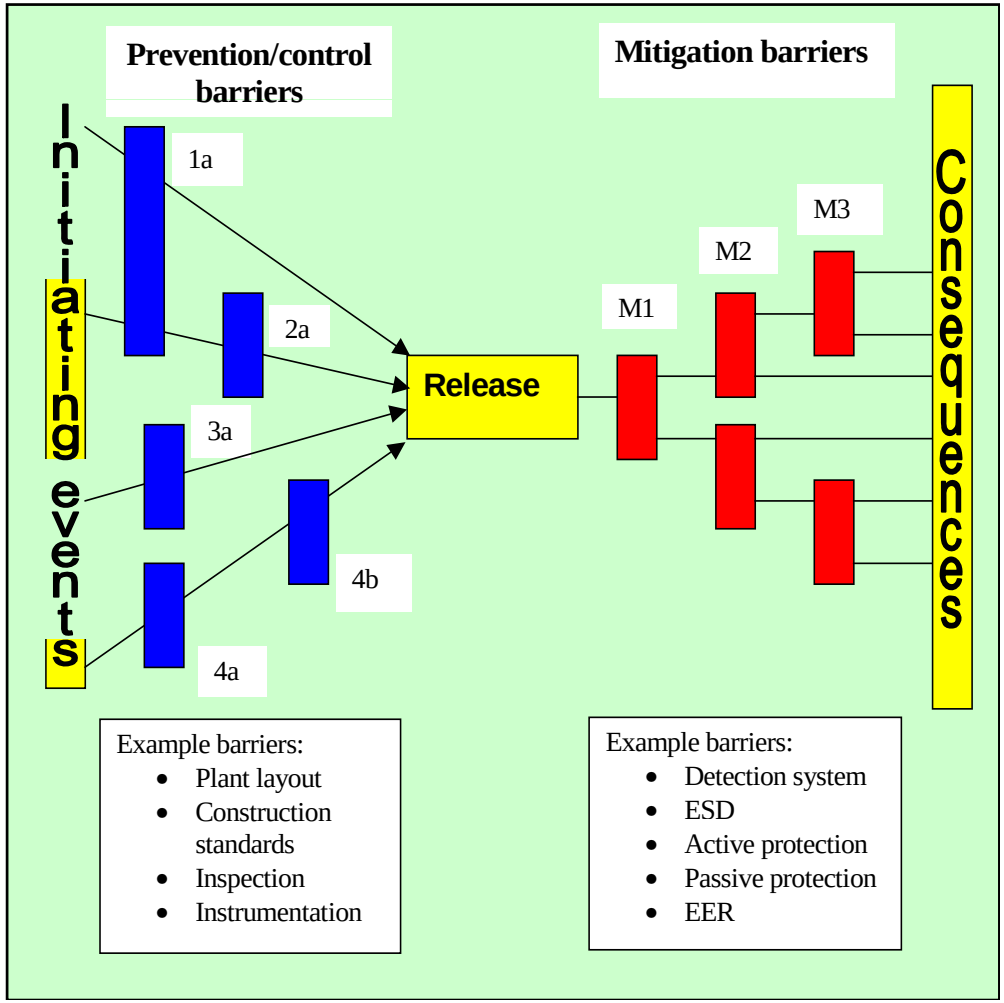
RISK MANAGEMENT

- Operational risk management



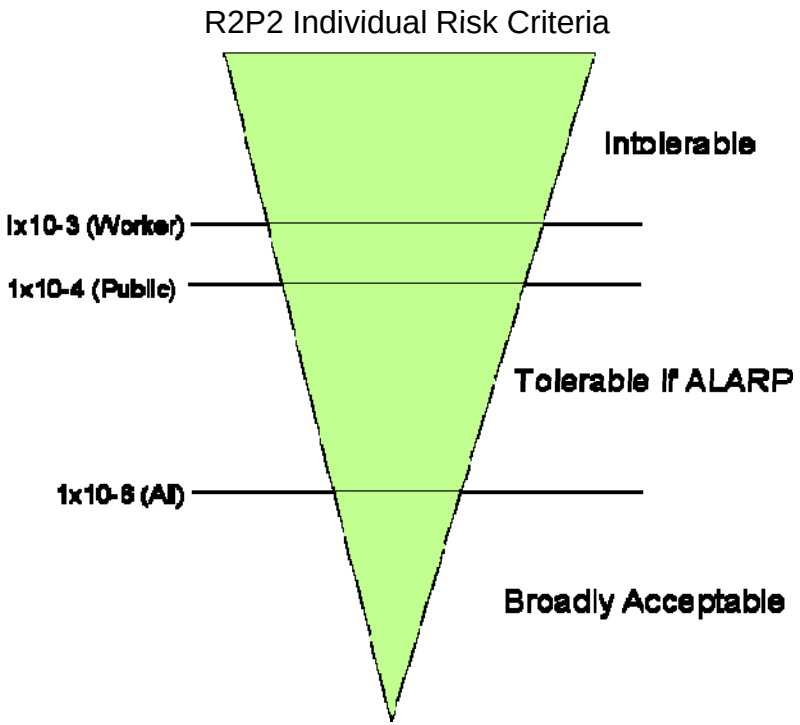
RISK ASSESSMENT

Frequency per year	Severity				
	A	**B**	**C**	**D**	**E** (highest)
I (highest)					
II					
III					
IV					
V (lowest)					



TOLERABILITY OF RISK

- '*Reducing Risks Protecting People*': http://www.hse.gov.uk/risk
- Individual risk
  - Member of the public
  - Workers
- Societal risk
  - Aversion to certain types of event



GOOD PRACTICE

- Approved codes of practice (ACOP)
- Standards
  - CEN, CENELEC, ISO, IEC, national (e.g. BS)
- HSE Guidance
- Other government departments
- Trade associations
- Professional institutions

'Good practice' changes with time as knowledge about hazards improves or risk acceptability criteria develop

ALARP CONCEPT

- 'Goal-setting' approach
- Between the *intolerable* and *generally acceptable* regions, need to demonstrate risks are *as low as reasonably practicable* (ALARP)
- ALARP concept is fundamental to the UK regulatory approach – has legal basis
- Balance weighted towards health and safety improvement in cost benefit analysis unless there is gross disproportion
- Environmental equivalent: best available technology not entailing excessive cost (BATNEEC)

RISK REDUCTION MEASURES

Examples:

- Laboratory characterisation of explosion characteristics
- Install explosion vents
- Ignition prevention
- Gas detectors
- Improve Safety Integrity Level of electronic control
- Automatic ESD
- Control room structure
- Remote operation
- Higher specification local extract ventilation & filters
- More maintenance effort
- Training of operators

KEY DRIVERS

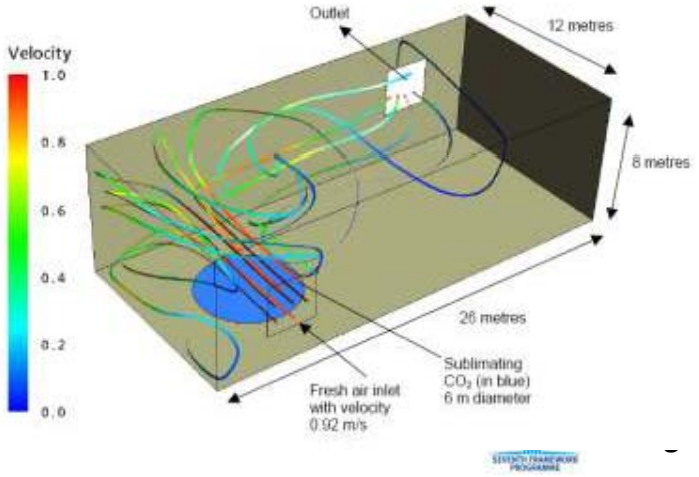
- Science and technology
- The workplace and working practices
- Socio-economic trends that affect the labour market
- Trends in public attitudes towards risk
- The national political agenda
- The European Union
- International developments (globalisation)

HOT TOPICS

- CO2 Capture & Storage
- Complex Working Practices
- Cyber Security
- Demographics
- Flexible Working Patterns
- Future of Keyboards
- Gene Therapy
- Human Performance Enhancement
- Hydrogen Economy
- Nanotechnology
- New & Emerging Pests
- Obesity
- Pervasive Computing
- Rapid Manufacturing
- Recycling
- Robotics
- Solvents Directive
- Sustainability
- TeraHertz Technology

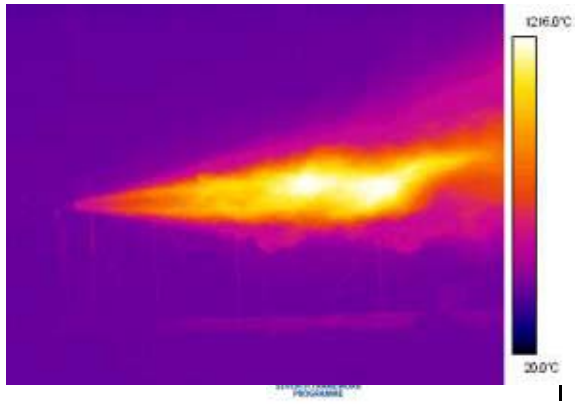
CARBON CAPTURE & STORAGE

- Capture → Pipeline → Storage



HYDROGEN ECONOMY

- Combustion or Fuel Cells
- Vehicular and Stationary Applications (CHP)
- H_2 Generation
- Storage (High Pressure, Adsorption)
- Distribution
- Public Perception



SHE REGULATOR EXPECTATIONS FROM iNTeg-Risk

- How should the regulator take into account new and emerging risks
  - General methodologies and tools
  - Specifics for key areas

- Need to avoid nasty surprises