Health and Safety
Executive

Onshore Pipeline Integrity Delivery Guide

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Where Delivery Guides came from

- IDGs/DGs have been around for a while
- Produced in support of HID workstreams
- Tended to be inward-facing, gave inspectors guidance on what issues to inspect, where, when and how to record activities on HSE's data systems

Where Delivery Guides came from

- 2008 – COMAH remodelling:
  - Identified strategic priorities for CA inspection on COMAH sites
  - DGs produced for strategic priorities
  - Aimed at inspectors and dutyholders
  - More detail of the ‘how’ as well as the ‘what’

Format of DGs

- No prescribed format
- Vary greatly in length & detail
- Good thing! Flexibility in development of pipeline DGs
- Tried to take best bits from what we already have
- KISS

What this DG isn't

- Not a change in how we inspect – the process will be the same
- Not a change in the standards we inspect against – the goalposts haven't moved
- Not reducing inspections to a 'box ticking' exercise – professional judgement of specialist inspectors still fundamental to the process

Benefits for inspectors

- Supports the delivery of consistent and effective interventions by highlighting key areas to be covered during inspections
- Provide a framework for inspectors to judge compliance, assign performance ratings and decide what (if any) enforcement action to take
- Coherent link to EMM/EPS and competency management arrangements

Benefits for dutyholders

- Help them to prepare for inspections
- Assist understanding of intervention plans
- Greater transparency regarding the inspection process
- Tool to help operators assess their own performance and be proactive, e.g.
  - gap analysis against DG
  - identify areas for setting safety performance indicators (SPIs)

Benefits for HSE

- Consistency: assurance that key issues will be covered across the piece
- Accountability: sets out standard against which HSE's performance as a regulator can be judged
- Targetting: performance rating allows greater resource to be directed to poor performers
- Proportionality: links to EMM & wider procedures for risk ranking sites
- Transparency: along with intervention plans, clearly communicates inspection priorities to dutyholders

What does the DG look like

1 Purpose – what's it for

2 Scope - what it covers

3 Justification – why do we need it

4 Relevant legislation – not all of it, but the most important legal provisions

5 Core intervention issues & success criteria – more about this later

6/7 Judging success, assigning ratings, recording outcomes

Appendix – standards & reference documents

Core intervention issues

1 Pipeline design compliance and the identification and assessment of integrity management arrangements

2 Pipeline safety management system (SMS)

3 Implementation of the pipeline integrity management process

4 Emergency planning and preparedness

(same as offshore DG)

Success Criteria

- The most important bit arguably
- ‘What does success look like’
- ‘Must haves’ (although not all universally applicable – professional judgement needed)
- Operator performance rating based on achievement of success criteria
- Consistency & transparency – operator knows what we will be looking at, how compliance will be judged and what consequences of failure to comply could be

How the DG was developed

- First draft based on existing published guidance (L82 etc), inspection manuals, crib sheets etc
- Extensive consultation with specialists via correspondence, meetings & workshop:
  - are all the key elements included
  - are success criteria:
    - as clearly described as possible
    - legally enforceable (if they apply)
  - have we referenced appropriate standards (previous tendency to mention every standard that ever existed – not very helpful!)

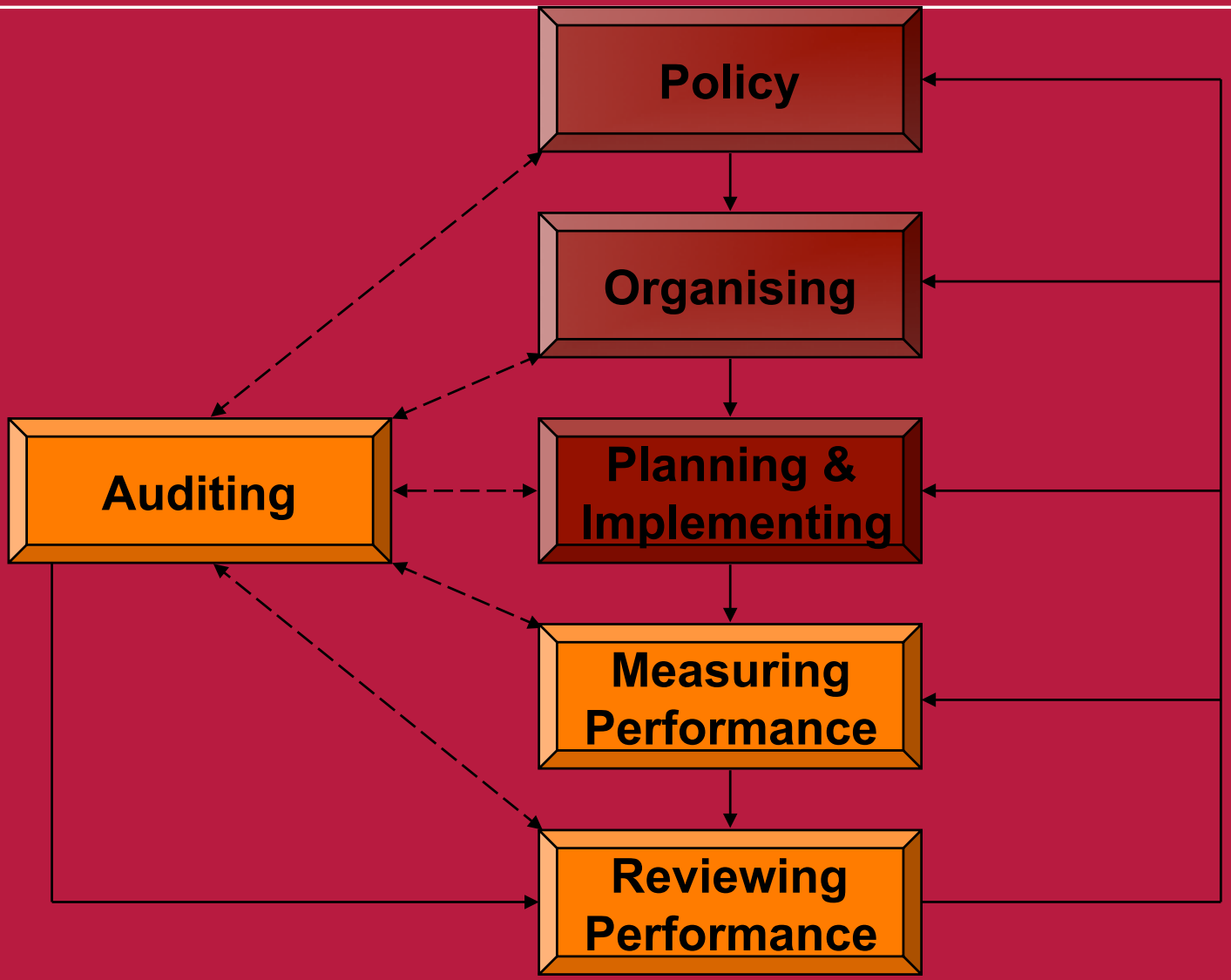
Consultation with industry

- Draft DG shared with UKOPA & GTOSG
- Feedback sought
- Important message:
  - We know it's not going to be 100% right first time
  - We are committed to a process of review & if necessary revision
  - We will listen to the views of industry as part of this process

Health and Safety Executive

Safety Performance Indicators

HSG65 – Successful Health & Safety Management



Recent industry history

- Unacceptable level of process safety related dangerous occurrences, especially losses of containment
- Major hazard industries using lost time and personal injury rates to measure safety performance
- BP Grangemouth, Esso Longford, BP Texas and Deepwater Horizon investigation reports highlight importance of adopting the right measures

Past lessons learned

- “I knew everything was all right because I never got any reports of things being wrong”.

  (Occidental senior manager at the Piper Alpha enquiry)

- “Prior to any disaster there will nearly always be warning signs - information somewhere within the organisation that trouble is brewing. The challenge is to find ways to assemble this information and move up the hierarchy to the point where it can be understood and responsibly acted on”

  (Andrew Hopkins, lessons from Longford)

How not to do it

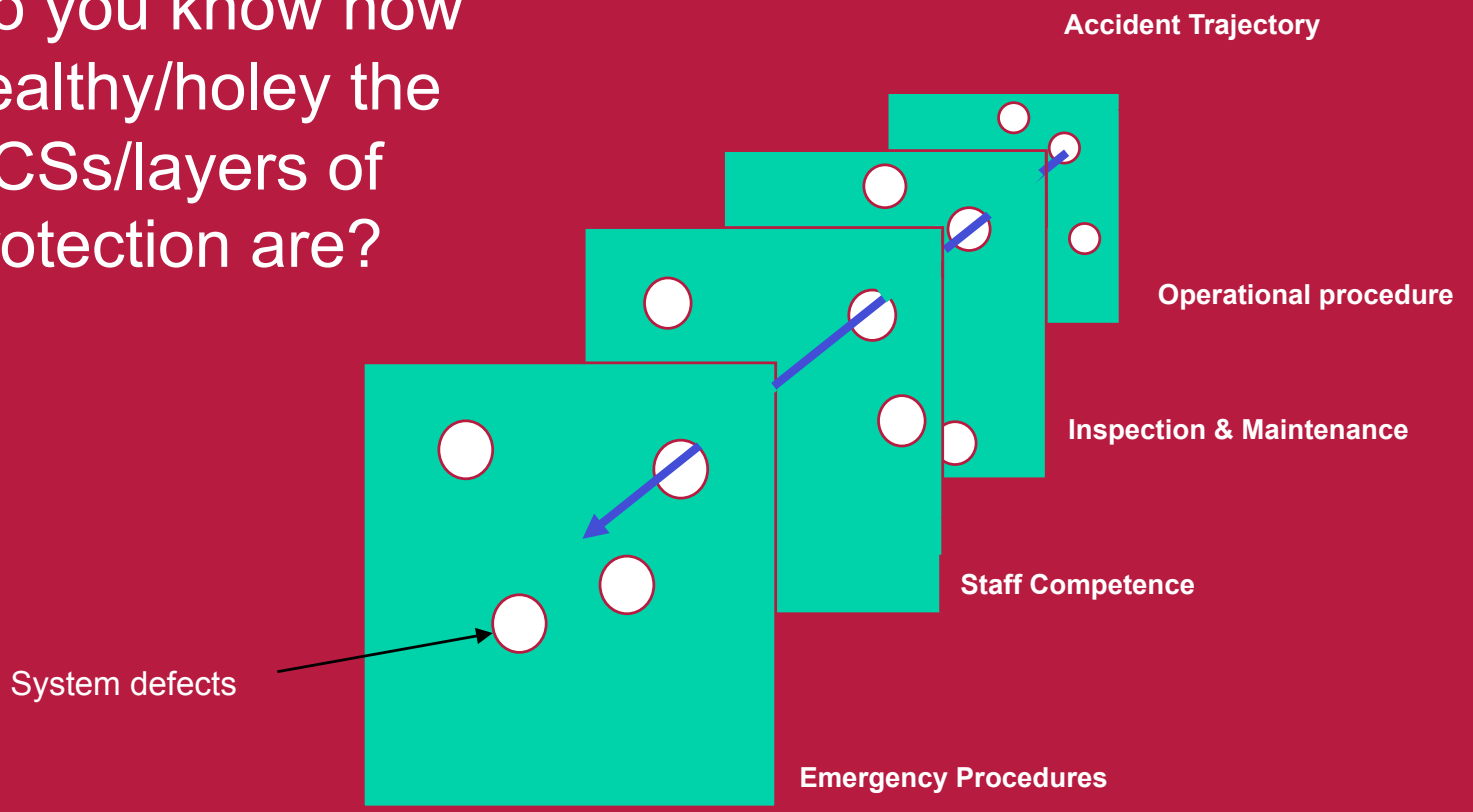
- Reliable measurement of the wrong things can be as misleading as unreliable measurement of the right things
- Hopkins @ Longford - would you measure the safety of an airline by injury rates of baggage handlers?
- Measuring the wrong thing drives wrong behaviour/focus - what gets measured gets done!

In the absence of SPIs

- “There’s never been a major accident here” - false sense of security
- How do senior managers know that a major accident isn’t just around the corner?
- Malfunctions in safety-critical systems often result in ‘latent failures’
- Failure may only become apparent in a real emergency when e.g. back-up generator / ESD / non-return valve (or safety-critical human!) fails on demand

How Accidents Happen

Do you know how healthy/holey the RCSs/layers of protection are?



After J Reason – Accident Trajectory Model

How to set SPIs in a very small nutshell!

- Identify your major accident scenarios
- Identify the critical systems/measures in place to prevent/control/mitigate effects of MAs
- Think about ‘what success looks like’ if these systems/measures are working correctly, and what will go wrong (short of a major accident) if they aren’t
- Select SPIs linked to these
- This will give you a ‘health check’ of your critical systems before they are called upon in anger

How to set SPIs

SPIs can be set at different levels:

- operational control/plant level e.g. temp/press variations, increased manual override of automatic systems etc - may give early warning of process instability, plant ageing effects, staff competency issues etc
- generic risk control system e.g. compliance with permit to work, management of change, contractor selection etc procedures – higher level indicators for critical RCSs
- programme level e.g. progress against plans for maintenance, staff training, auditing etc – generally easy to measure & interpret

Leading/lagging SPIs

- Leading indicators: routine, systematic check that key actions/activities are done correctly
- Lagging indicators: a desired safety outcome has not been achieved
- Beware of perverse outcomes, e.g. lagging SPI set for PRV in-service test failures - 0% failure rate & SPI met if tests not done at all
- Set leading SPI too (% PRVs tested on time)
- Try to set leading and lagging SPIs for each critical risk control element/barrier

Operational control indicators

Lagging Indicators

- Identify challenges to integrity
- Select the lowest detectable event e.g.
  - Overfilling
  - Overpressure
  - Over temp
  - Low flow
  - Excessive corrosion
- Set indicator at the earliest point of deviation ('tolerance')

Leading Indicators

Critical operator Actions to:

- set process controls/operating envelope correctly
- take remedial action if process deviation from operating envelope
- routine operation control – monitoring actions

Inspection and maintenance of process control instruments and alarms

Generic RCS indicators

GENERIC RCS

eg PTW, Plant change, Emergency arrangements

Lagging Indicators

- Loss of containment incidents
- Process upsets
- Demand on safety systems, e.g. bursting discs, ESDs

Leading Indicators

- Critical tasks undertaken correctly eg PTW, change control, emergency response drills

PROGRAMME INDICATORS

Leading Indicators

- % statutory inspections completed to time
- % audits completed to time
- % audit actions closed out on time
- % staff trained to specified competence
- % procedures within review date etc.

Health warning!

- Don’t get bogged down in the ‘is this a lagging or leading indicator?’ debate
- Key questions - ‘does this tell us something useful and can we measure it’?
- If ‘yes’ – consider setting PSPI
- You won’t get it 100% right first time - ongoing review of selected SPIs important

Learning points

- Senior management must buy in and must understand the process – there should not be an expectation of only good news/green lights, if SPIs are working they should flag problem areas
- Always try to get as close to the process as possible
- Setting right tolerance is critical & may take time
- Include identification of potential SPIs in investigations into accidents, near misses etc

Learning points

- Difficult to get really meaningful metrics without a detailed knowledge of site and operations (and snags & niggles) – involve operators in process & be prepared to get your hands dirty!
- Can be hard to identify leading and lagging indicators in all cases, do your best but try not to get hung up on this
- SPIs can often use data that is already being collected/reported for other reasons

Learning points

- Danger of too much data, don't go mad!
- If sustained good performance achieved, look for the next possible area of weakness & consider revising SPI suite – monitoring SPIs is not an end in itself!
- Few people at plant manager level know their process is deviating from operating parameters unless PSPIs are set
- 'One size fits all' corporate SPI suites have their place but plant-specific metrics likely to be most informative

Centre for Chemical Process Safety Guidance

- Recommends a concise set of lagging metrics and suggests leading metrics and near miss reporting definitions.
- Some difference in definitions
- Pre-drafted generic set of metrics

http://www.aiche.org/ccps/

American Petroleum Institute

- Guidance on the collecting and reporting of lagging indicators
- Proposing new ANSI/API standard – *Process Safety Performance Indicators for the Refining and Petrochemical Industries* – (Texas City)
- www.api.org/ehs

HSG254 ‘Developing Process Safety Indicators’

- Developed jointly with the CIA using information and ideas from industry