



Reducing Impact of Knowledge Loss

How Offshore Decommissioning can learn from other industries, including nuclear decommissioning

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About DNV GL

DNV GL: Global reach – local competence



150+
years

100+
countries

100,000+
customers

12,500
employees

Our vision: global impact for a safe and sustainable future

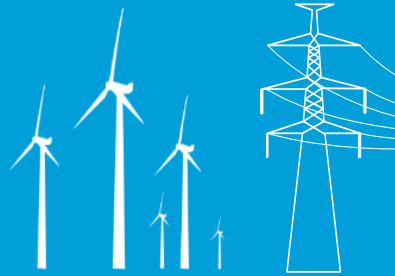
MARITIME



OIL & GAS



ENERGY



**BUSINESS
ASSURANCE**



**DIGITAL
SOLUTIONS**



TECHNOLOGY & RESEARCH





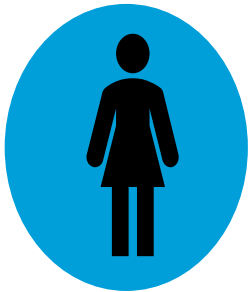
Challenges

Challenges

10,000

In the US alone, 'roughly 10,000 "Baby Boomers" will turn 65 today and about 10,000 more will cross that threshold every day for the next 19 years'

Pew Research Centre, 2010



Lone Experts



Retirement



Parental Leave



Staff contractions



Job Rotation

Too good to be forgotten



© Shutterstock/NASA

- In a 2004 speech at NASA Headquarters in Washington, D.C., George W. Bush said that the "new course for America's space program would give NASA a new focus and clear objectives for the future.
- We do not know where this journey will end," said Bush, "yet we know this: Human beings are headed into the cosmos'

David DeLong (2004)



O&G



Nuclear



Steel



Mining



Infrastructure



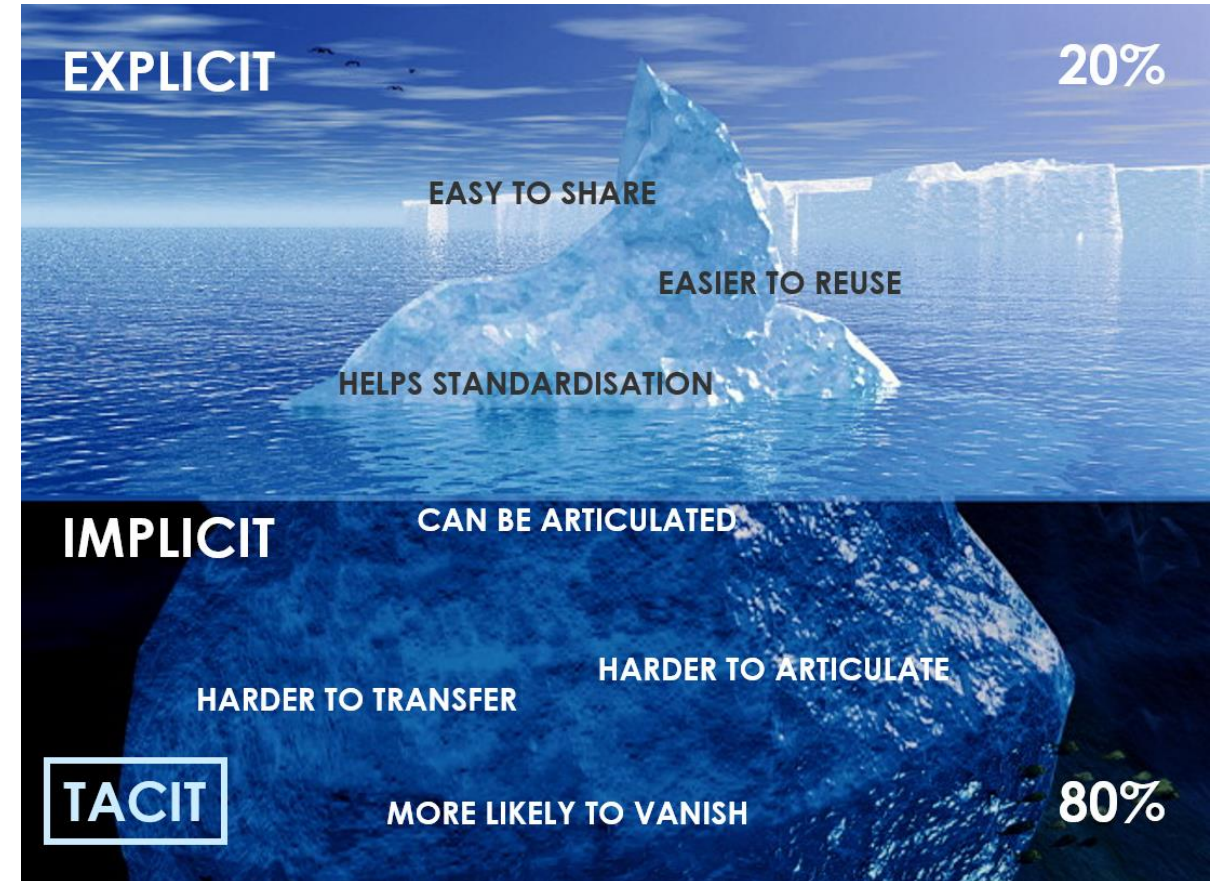
Energy

Decommissioning is expensive and will be a long process

- NDA Estimates that to decommission and clean up all 17 UK Sites will take approximately 120 years and cost £119billion (based on 2017 plan).
- A similar Oil and Gas Authority study for Offshore installations in 2017 estimated this to be £39-60billion and go beyond the year 2025 (including a target of 35% cost reduction).
- In that same time period how many people will retire, projects be completed, people move jobs or simply information be lost?
- A McKinsey Research study has found that 24% of our working week is spent in trying to find knowledge and expertise
- Can knowledge re-use, sharing and retention allow for even greater cost reductions then the OGA reduction target?
- What % of this cost might retention of knowledge allow?

Reducing the risks (and thus costs) for decommissioning and dismantling

- Planning to ensure robust knowledge risk management across:
 - People, assets and projects.
 - The transition between operations (late life planning), decommissioning, dismantling and scrapping.
 - All stakeholders, suppliers and contractors (including supply chain).





Our experiences

Retention of critical knowledge for Rijkswaterstaat

CUSTOMER CHALLENGE

Rijkswaterstaat, a Directorate within the Dutch Ministry of Infrastructure and the Environment, is in charge of Public Works and Water Management. Rijkswaterstaat is responsible for the sustainable development and maintenance of the national system of roads and waterways.

The Directorate has an annual budget of over €2 billion and employs more than 9,000 highly experienced and uniquely skilled professionals. The average age of the employees is relatively high, and consequently the organization is facing a huge risk of losing exceptional experience and expertise through retirement and job changes.



Photo credit <https://beeldbank-rws.nl>, Rijkswaterstaat

DNV GL SOLUTION

- DNV GL was asked to provide a methodology to enable facilitators and line managers to effectively manage a knowledge-retention process.
- Rijkswaterstaat and DNV GL co-developed a six-step methodology with supporting tools to assess and identify critical knowledge; plan and execute the knowledge transfer; and validate that knowledge was retained and reusable.

OUTCOME AND BENEFITS

- The methodology and supporting toolbox were piloted and validated with the customer and then documented and bundled into the “Knowledge Survival Kit” – a handbook for line managers and others.
- Rijkswaterstaat has deployed the “Knowledge Survival Kit” and embedded the competencies needed internally.

The right knowledge at the right time

CUSTOMER CHALLENGE

SGN is a gas distribution company managing a network that distributes natural and green gas to 5.9 million homes and businesses across Scotland and south England.

SGN is facing challenges associated with the potential loss of knowledge due to experts retiring or leaving. New recruits lack SGN-specific experience and knowledge of operations and assets. Currently, a small number of subject-matter experts hold critical knowledge. Knowledge of localized, sporadic, obscure and non-routine issues is held by a few people and not easily found by others. Ensuring that the right knowledge is available at the right time is essential to successfully fulfilling SGN's strategic goals.



Photo credit Getty Images

DNV GL SOLUTION

- DNV GL and SGN have a long history of collaboration and DNV GL was asked to make recommendations for a critical knowledge retention programme. The roll-out recommendations were based on two typical scenarios which may lead to the loss of knowledge.
- DNV GL managed two pilot projects to demonstrate how knowledge can be captured, retained and shared for re-use.
- One pilot deployed a range of tools that we have developed to help capture and share the knowledge held by an individual expert.
- The other pilot focused on the asset knowledge at a specific SGN site and made several videos in which experts narrated their knowledge of individual mechanical and electrical assets and site-specific issues relating to access, safety and security.

OUTCOME AND BENEFITS

- The expert's knowledge was captured by creating maps of his professional network, a list of frequently asked questions, some top tips for colleagues and a series of short videos made during presentations to colleagues.
- In the videos focused on the assets, local experts shared their knowledge about atypical issues, non-standard maintenance routines as well as access and safety matters.
- DNV GL has created prototypes of a knowledge retention portal that will help SGN to disseminate and reuse the results.
- The knowledge retention roadmap created by DNV GL sets out a vision of how SGN can embed the program into its management system.

Identify and retain critical knowledge

CUSTOMER CHALLENGE

The Nuclear Decommissioning Authority (NDA) is the government agency responsible for the safe and effective decommissioning of the UK's civil nuclear legacy. The NDA plays a strategic role in implementing government policy, managing 17 sites and ensuring it has the right skills and resources to fulfil its mission. The industry in the UK has an ageing workforce and the NDA needs to take a robust approach to retaining the knowledge it needs and ensure it leads the industry in innovative ways to address this issue.



Photo credit Magnox Ltd

DNV GL SOLUTION

- DNV GL has created a tool for the NDA to identify critical knowledge, and has validated the tool in pilots with some key NDA departments.
- DNV GL piloted an approach to knowledge retention at the NDA's largest and most complex site and has subsequently supported the NDA in implementing an enhanced version of that approach within its organization to help inform and influence the industry more broadly.
- The approach has two elements. Firstly, a web-based application was designed to help assess the potential risk of knowledge loss across NDA staff. Secondly, the NDA knowledge management team was coached in methods to capture and transfer knowledge in a number of pilots.

OUTCOME AND BENEFITS

- The NDA is now able to identify its critical knowledge and review its approach to managing that knowledge for the benefit of its mission.
- The NDA has a robust risk assessment programme, can identify where any potential vulnerabilities may lie in terms of knowledge availability over the short to medium term and can deal with those risks proactively.
- The NDA has developed a toolkit for supporting knowledge capture and transfer that includes audio-visual methods as well as knowledge maps and digital knowledge 'bytes'.



Lessons Learned

Ignoring the risks will have its own costs

1. Costly mistakes are duplicated because earlier ones were not recorded or analysed
2. Work is redone because people are not aware of activities, projects in the past or their outcomes
3. Customer relationships are damaged because knowledge is not available at the point of action
4. Good ideas and best practices are not shared which raises overall costs
5. 1 or 2 key employees hold crucial knowledge
6. The company learns too slowly which results in delayed product development or missed opportunities
7. Employees are frustrated because knowledge resources are not available



In my organisation, we have experienced:

1. That mistakes are repeated over time.
 - Agree / Disagree / Don't know
2. Good ideas and proven practices are not systematically shared.
 - Agree / Disagree / Don't know
3. Knowledge of experienced employees is not captured and retained systematically.
 - Agree / Disagree / Don't know
4. A small number of key employees hold critical knowledge
 - Agree / Disagree / Don't know
5. Employees spend extensive time to search for information and expertise.
 - Agree / Disagree / Don't know
6. The organisation learns too slowly, which results in delayed product development or improvements.
 - Agree / Disagree / Don't know

Addressing knowledge risks has its own benefits

Improved access to knowledge

Reduced lost time through improved search for available knowledge



Reduced rehire cost

Reduced need to rehire retired employees



Improved project performance

Improve application of lessons learned within and across projects, avoid duplication of errors

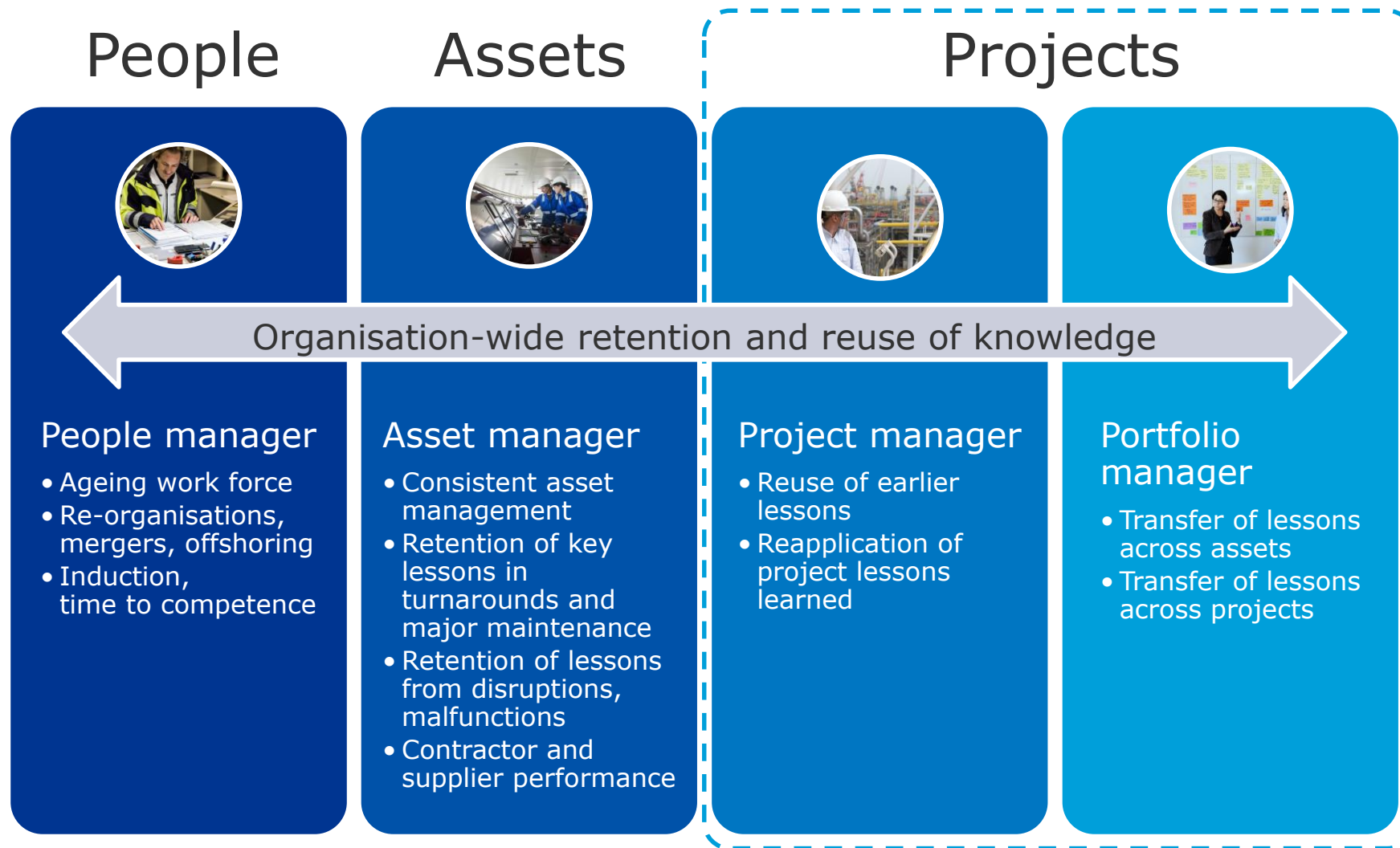


Improved asset performance

Improve asset availability along the asset life cycle



Understanding the risks needs different perspectives



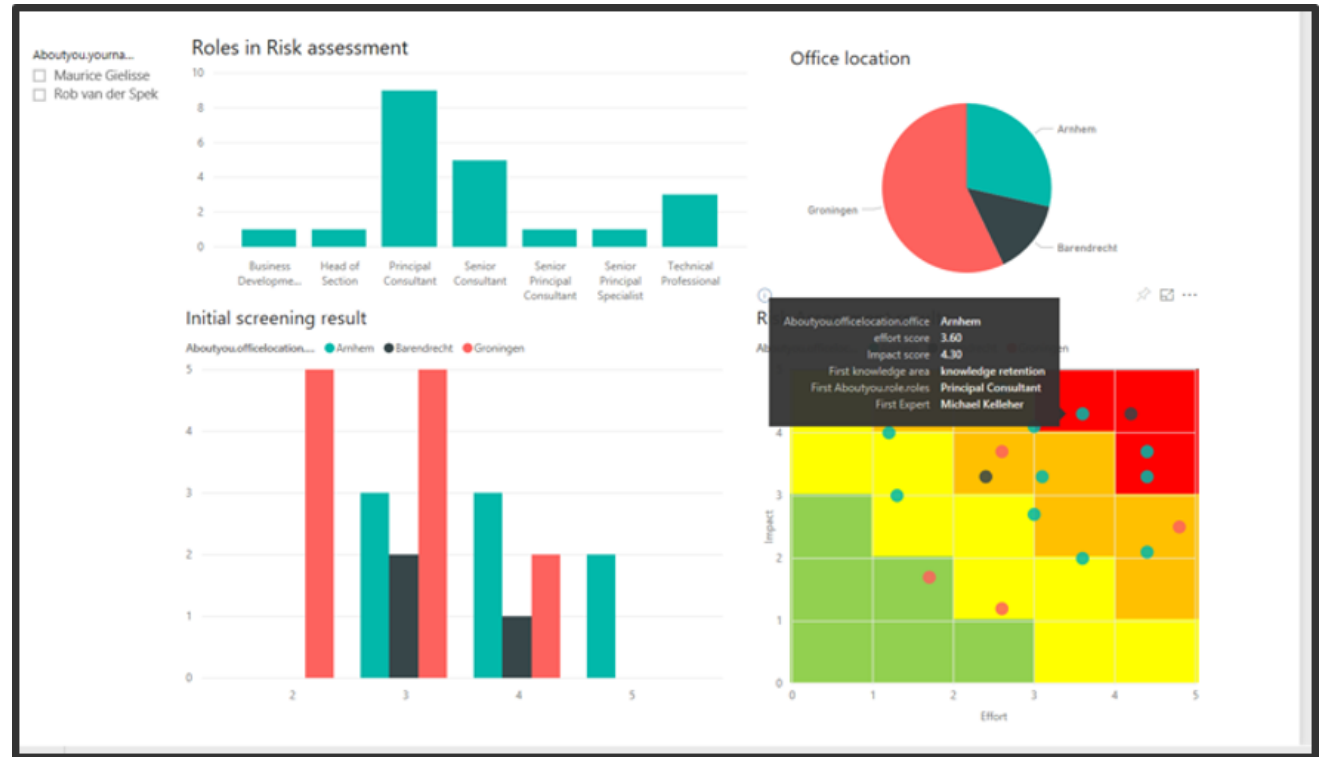
Addressing the risks needs a robust approach





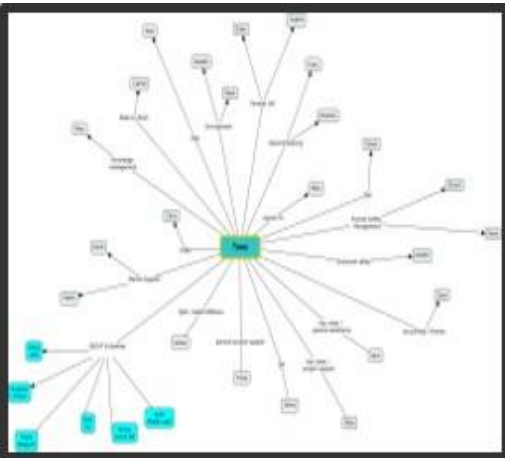
People

Identify and Evaluate

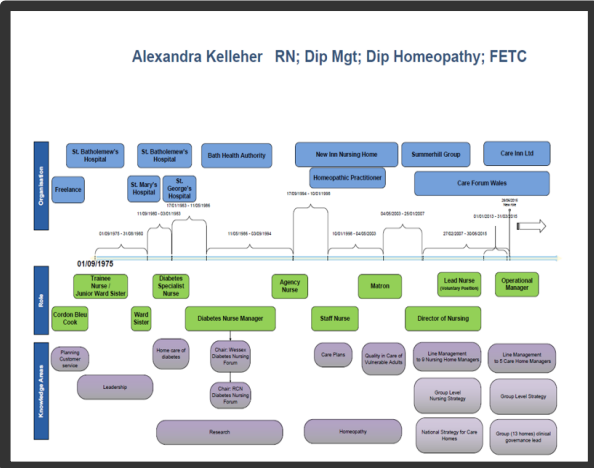


Knowledge Risk Management

Capture / transfer the knowledge



Personal Network Map



Career Map

In **DNV GL ROCK** stands for Retention Of Critical Knowledge. This programme has been designed to help managers keep critical knowledge in their team after an expert has retired or is transferred. The process can also be used to understand the valuable knowledge and expertise of experienced new hires. ROCK Services in the UK are coordinated from offices in Loughborough in partnership with the [Global KM Hub](#) in Arnhem.

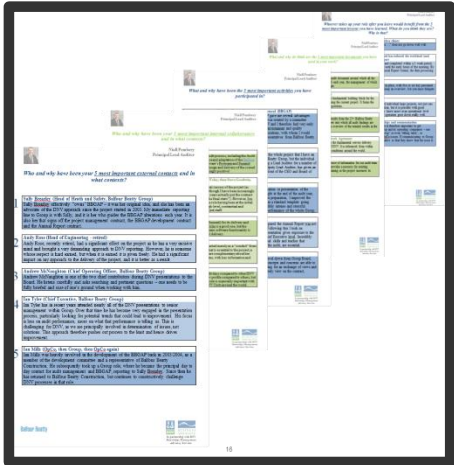
The benefits of this programme are to mitigate the risk that missing knowledge might pose, ensure crucial knowledge is disseminated across the region, reduce the learning curve for your new employees and make it easier to transfer knowledge within our business.

ROCK is underpinned by an assessment tool that enables the company to evaluate the potential value and re-use of the knowledge held by stakeholders and generated in projects.

Facilitated ROCK sessions use tools such as [Personal Network Maps](#), [Concept Maps](#) and [Pearls of Wisdom](#) amongst many others available in our [ROCK Resource Centre](#).

This means helping to identify suitable candidates, executing a 'critical knowledge interview', identify techniques to capture knowledge for each of the identified critical knowledge areas and consolidating the captured information into a 'ROCK report', a valuable resource for the organisation.

READ Me



Pearls of Wisdom

Pipeline repair matters

How do we assess damage?
 P12 is the company document for damage assessment. It is written by an accredited personal P12 Technician and a P12 Engineer. It is not for through wall damage.

What is P12?
 All [DNV GL](#) mains were laid with only SON radiography thus they must be managed when excavated in a different way. The P12 document defines these requirements. [Click](#) if you are exposed the opportunity to radiograph them must be exercised.

Can P12 be used on fittings?
 Not the current SON document but policy [click](#) looking at upgrading the document as the one we use is the Blackwater.

Can you fit an epoxy shell on a leaking main?
 In most cases no but if the shell is manufactured as a special and is in the form of a hot tap then it is possible.

What type of repairs can we use?
 This is very much what is [approved](#) and things are changing every year. In the main it is an epoxy [click](#) but Clock Spring is being used by other [DNV GL](#) thus it is worth asking policy.

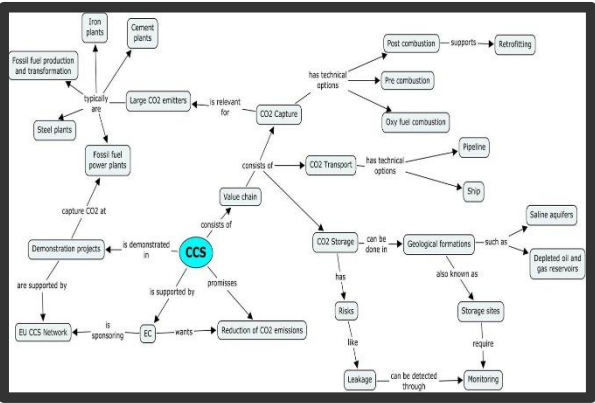
When is clock spring?
 Clock Spring is very much what it sounds like it is a band of metal that is wrapped with epoxy around the main. A specialist company would supply the service.

How much will this cost?
 It is very dependent on site, location, [click](#) costs but a 600mm shell fitting all in could cost in the order of 60k plus.

FAQs



An Audience With



Concept Map

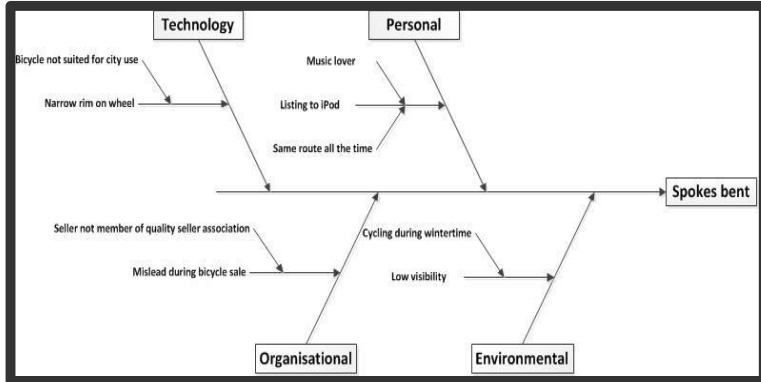


Peer Assist



Assets

Capture / transfer the knowledge



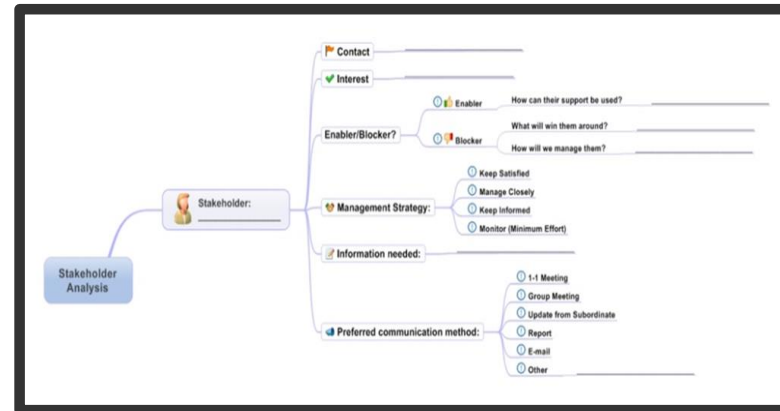
Causal Mapping



Plant Walkdown



Asset Map

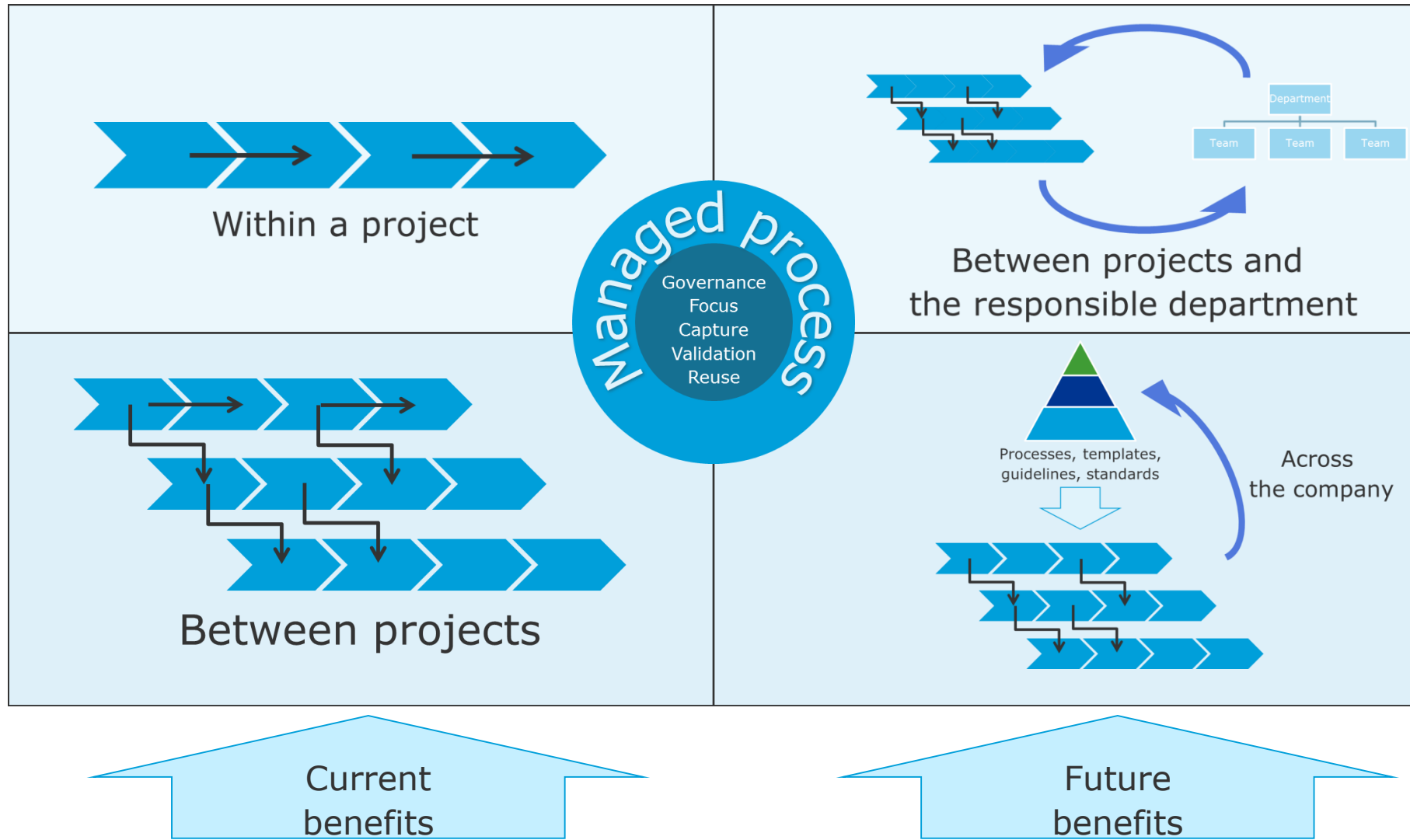


Stakeholder Mapping

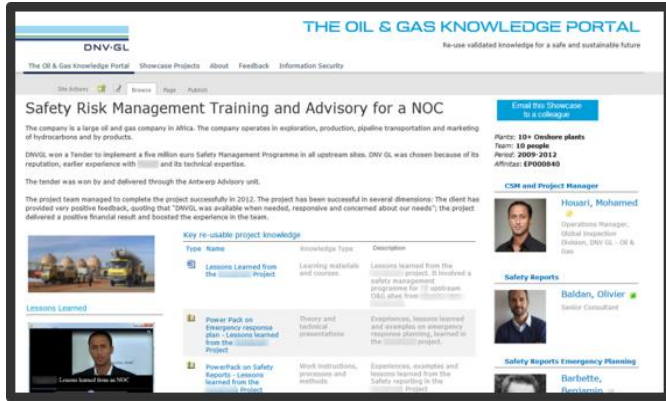


Projects

Optimising learning opportunities



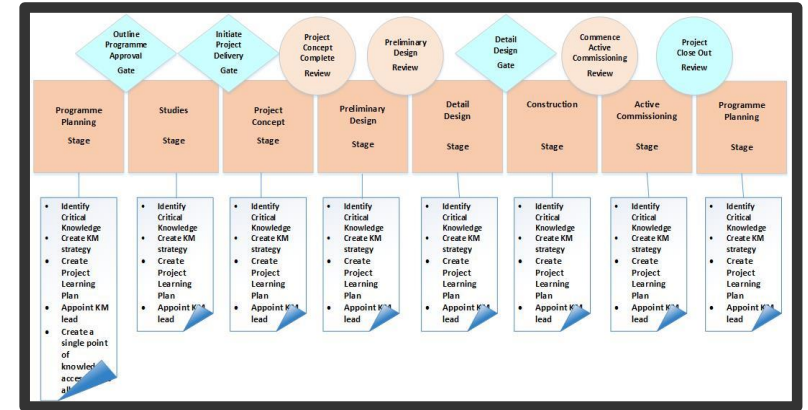
Capture / transfer the knowledge



Project Showcase



Knowledge Markets



Gated Process Knowledge Risk Plan



Sharing Events

Business Performance Indicators		Scoring		
1	Onshore Pipelines Team UK	1-3	Minimal: This knowledge and information area has little impact on safety or operations	
2		4-5	Minor: Prevents reportable injuries or reduces hazards and / or prevents disruptions to a programme area	
3		6-7	Medium: Prevents major injuries or ill health and / or disruptions to multiple programmes	
4		8-10	High: Prevents disruption to a number of programme areas across the company and or loss of life	
5				
Knowledge Areas		Current Impact	Future Impact	Rational for impact
1	Corrosion Protection, Coating / Application	10	10	Core for our support to clients
2	Intervention and repair	10	10	Core for our support to clients
3	Pipeline Systems	9	9	Foundation. Underpins everything we do
4	Pipeline Integrity Management Systems	9	9	as above
5	Pipeline Components	8	8	as above
6	Wall Thickness Sizing	7	7	We need this knowledge for at least 50% of our contracts
7	Onshore Installations	7	7	as above
8	Pigging Inspection & Condition Assessment	6	6	Need this as part of our portfolio, although not used more than a few times per year
9	Major Crossings	5	7	Useful to have
10	Risk Assessment & Protection	5	6	Not needed much over last 3 years but we see a growing need in the next 3-5 years
11				
12				

Knowledge Health Checks

Centres of Expertise	Centres of Expertise									
	Independent Business Assessment	Process Learning & Improvement	Process Learning & Improvement	Process Learning & Improvement	Process Learning & Improvement	Process Learning & Improvement	Process Learning & Improvement	Process Learning & Improvement	Process Learning & Improvement	Process Learning & Improvement
1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1

Sharing Dashboard

Make the knowledge available and encourage further reuse



VeriGas Knowledge Retention Portal

Reuse knowledge for a safe and sustainable future



Key Contacts

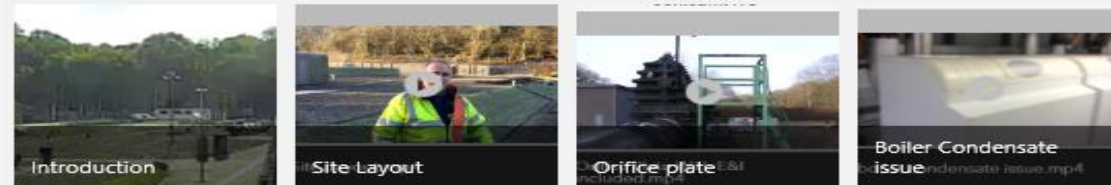


Mike Kelleher
Area Manager
P: +44 12345 5678
M: MKelleher@GasDistributionco.uk

About

Tumblehill is the largest network node in West Alicia

Selected Asset Videos

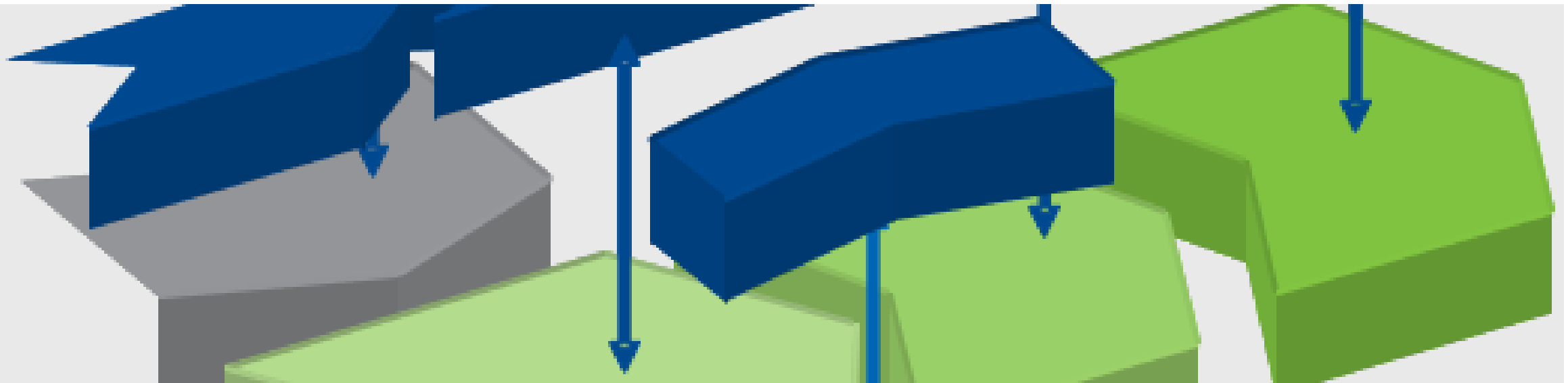


[View all asset videos >>>](#)

Knowledge Documents

✓ Name K-type Keywords

- ▶ Asset : (11)
- ▶ Asset : Boiler house (6)
- ▶ Asset : Control room (2)
- ▶ Asset : Electrical supply (2)
- ▶ Asset : Filters (1)
- ▶ Asset : Heat exchanger (1)
- ▶ Asset : Odorant injector (2)
- ▶ Asset : Orifice plate (2)
- ▶ Asset : Panic gates (1)
- ▶ Asset : Pipeline (1)



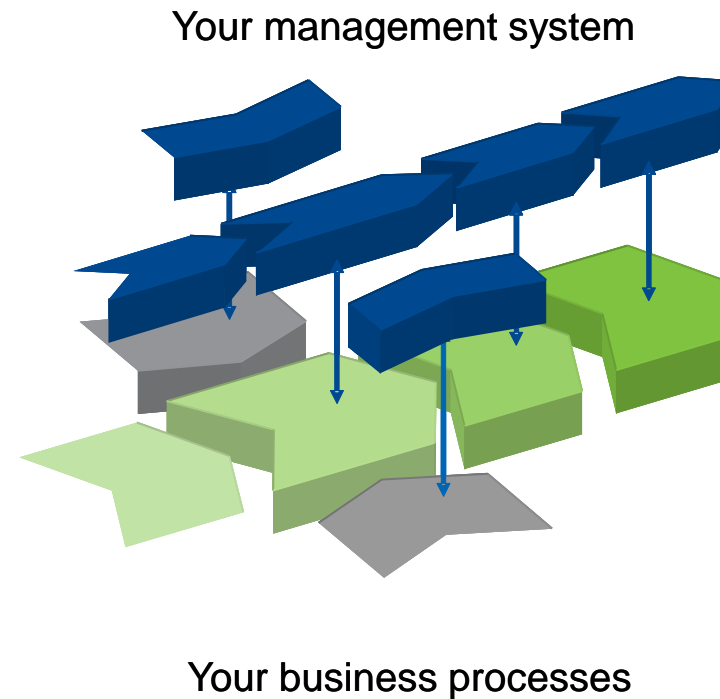
Embedding Knowledge Risk Management

Knowledge Risk Management Maturity

	Reactive KRM pilots	Proactive KRM Pilots	Programmed KMR	Institutionalised KRM
Business Driver	Individual Manager's problem Individual expert about to leave, repetitions of error in maintenance, no project learning	Organisational problem Several Experts, Asset or Project identified based on business value	Need for structural solution Structured approach for people, assets or project in parts of the organization	Need for integrated solution Integration of KRM processes and tools into other business management systems
Perception	Local urgency and need. <i>Ad-hoc firefighting</i>	Organisation wide need for a planned programme. <i>We want to prevent fires</i>	The need for a fully developed ROCK programme should be available on demand. Trained and local facilitators can deploy a range of tools. <i>We have a fire brigade</i>	The need for ROCK to be part of the management system. ROCK responsibilities should be assigned. Facilities should be adequately resourced. <i>We have a fire prevention system</i>
Intervention	Single individual, asset or project knowledge retention interventions	Several KRM interventions Local facilitators involved	Plan & Champion Facilitator Training Awareness campaign Tools & support	Inclusion of KRM into the management system including integration into HR processes and management reporting
Typical deliverables	Report with some artefacts Demonstration	Report with some artefacts / Evaluations Understanding about processes Experience	KRM activities established, including knowledge databases, Local facilitators Support tooling	Proactive knowledge risk management.
Outcome	Local awareness	Organisational understanding	Planned approach, resulting in structural reduction of the cost of ignorance	KRM is integrated in and contributes to business results

Integrating knowledge management into your management systems

- Reviewing your existing management system should be one of the first key steps you should take to improve knowledge risk management in your organisation.



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Framework





More information

More information

Michael Kelleher
Principal Consultant
Knowledge
Management
Competence Centre



michael.kelleher@dnvgl.com



+ 44 7920 500227



www.dnvgl.com/km



Antony Potts
Principal Consultant

Advisory Manchester



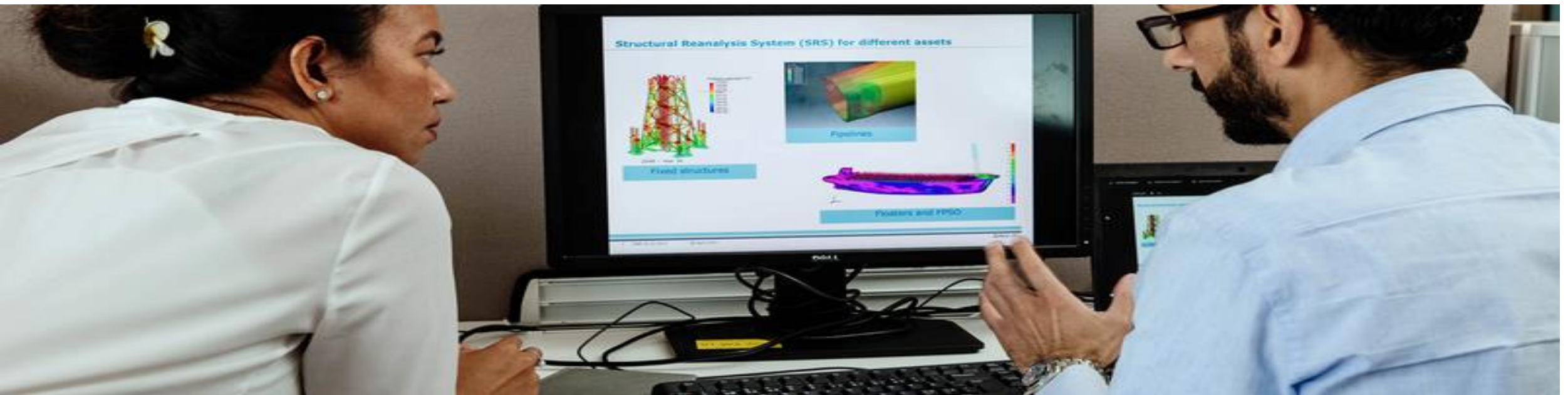
antony.potts@dnvgl.com



+44 2038 165503



www.dnvgl.com/km



Thank you