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# Digital Data Innovation: Assurance, Performance and Protection

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# Industry 4.0 - Imagine

...drones do most inspections



... everyone can be an expert with wearable and AI



... every asset has a digital twin



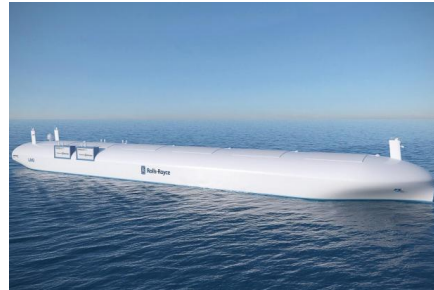
... trust needs no central authority



... every asset is connected



... ships are autonomous and unmanned



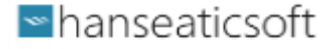
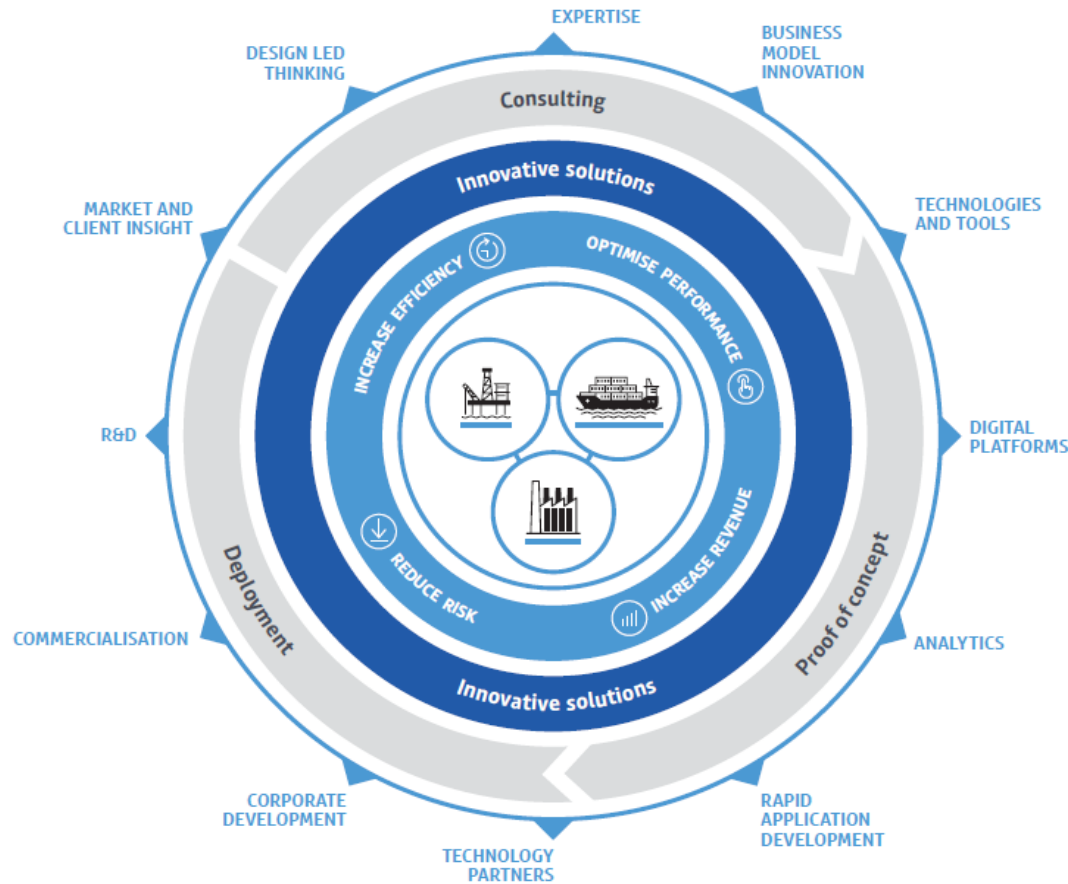
... AI is routinely used to make decisions



... all data from operations is in one place



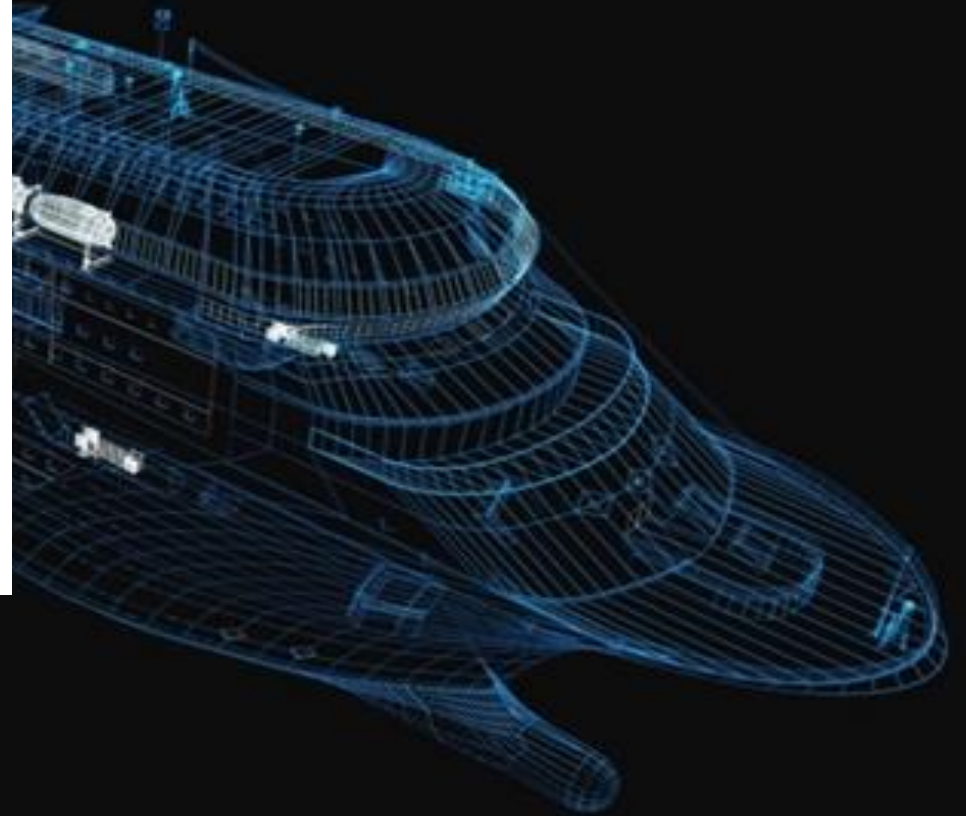
# Leveraging Expertise to Co-Create Value in Innovation



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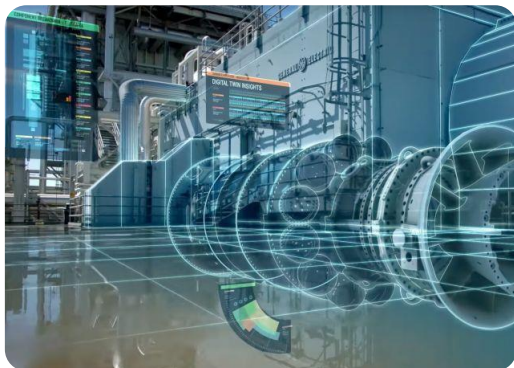
# Digital Class

Industry-first digital assurance  
framework



# LR Digital Compliance Framework

Supporting Requirements	LR Approval Level	
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**Digital Twin READY**  
DHM Provider approved

**Digital Twin APPROVED**  
Asset specific digital twin developed and approved at DHM Provider

**The DHM Provider**

**Digital Maintain\***  
DHM system integrated with vessels systems

**Digital Twin COMMISSIONED**  
Asset specific digital twin approved and commissioned at The DHM Operator

**The DHM Operator**

**ShipRight MPMS**  
Approval for a flexible maintenance regime

**Digital Twin LIVE**  
Digital twin function and performance demonstrated over time



\*Lloyd's Register Digital Ships ShipRight Procedure

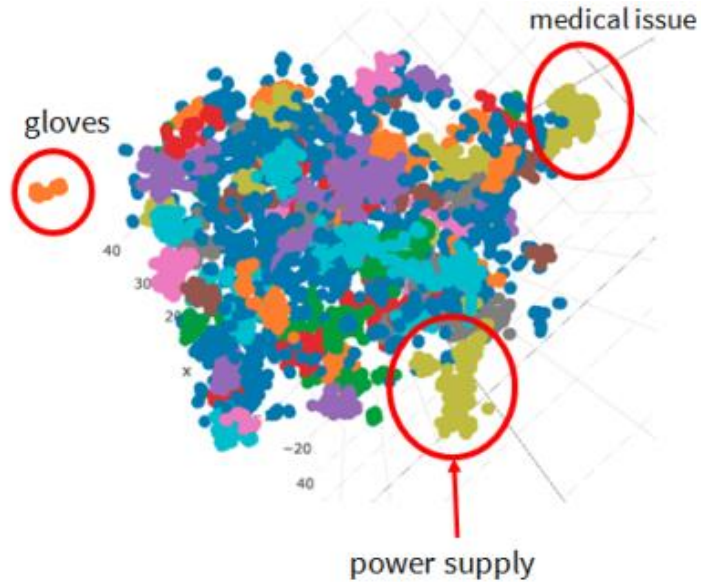
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# HSE Analytics

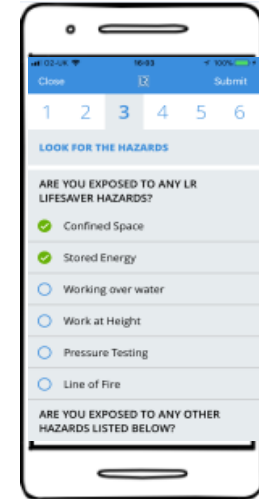
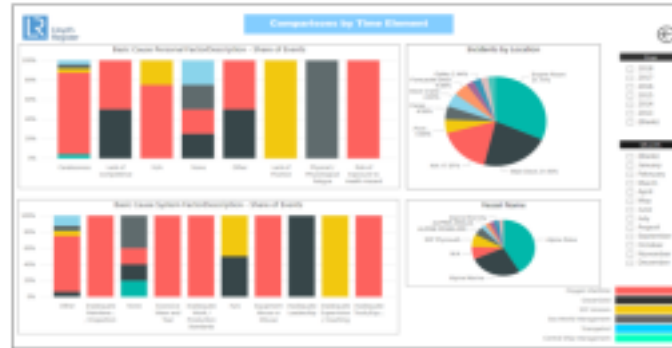
Data intelligence for a stronger safety culture and better business outcomes



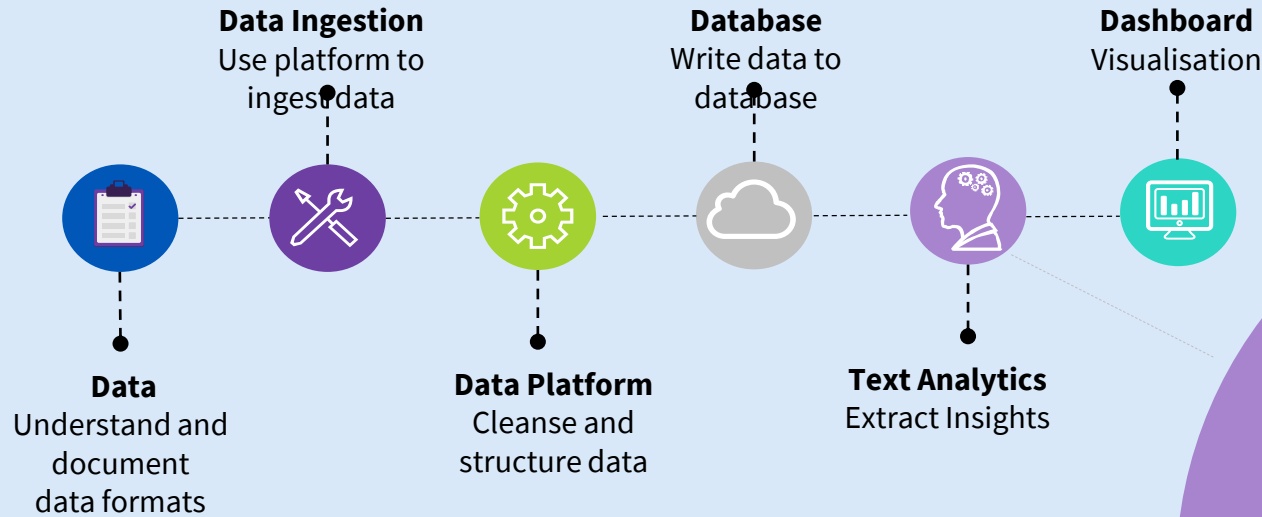
# Summary - Text to Insight



## Comparative Ratios



# NLP: The Journey from Text Data to Insight

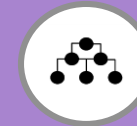


## Extracting data insights through NLP



### Near-Miss

Speed up review of near-miss events by automating process.



### Hazard Taxonomy

Classify events as specific hazard types based on free text.



### Observations

Review observations to extract all information



### Insights

Extracting insights from unclassified "other" events.



### Multi-Labeling

Capture multiple events in a single report e.g. slip/trip from ladder at height

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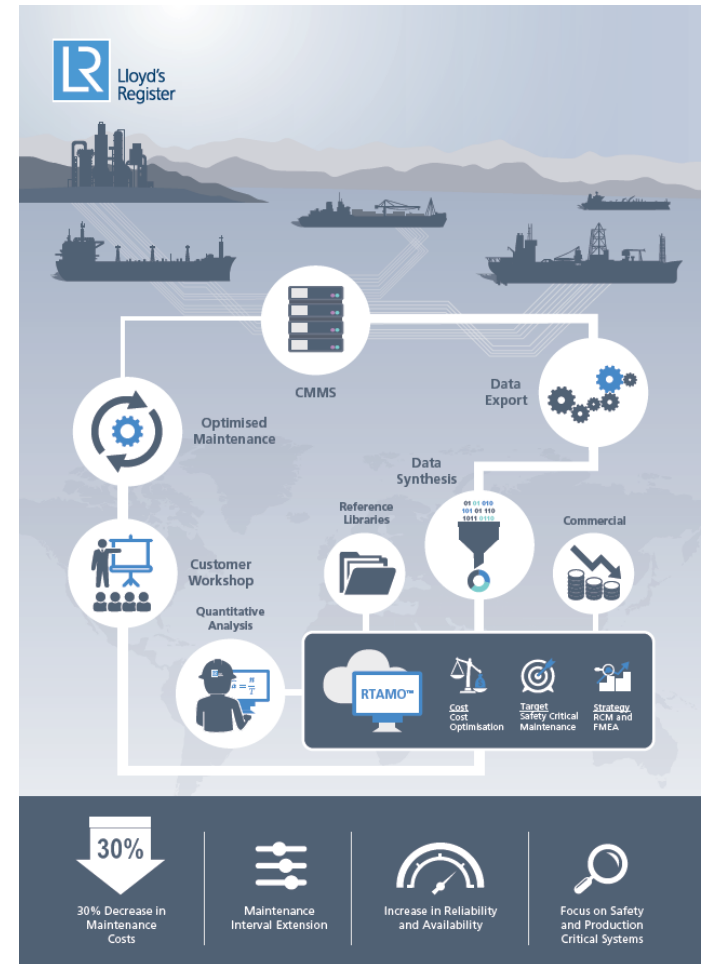
# Asset Optimization

Harnessing technology to optimise performance and reduce cost and risk



# LR Maintenance Optimization – All Assets

- Developed **over 10 years**
- Sophisticated, quantitative algorithms model your assets
- Develops a ‘**digital twin**’ of the Integrity, Maintenance and Reliability of your asset
- ‘Tunes’ activity in response to changing asset economics and equipment reliability
- Ensures Lowest Total Cost of Ownership



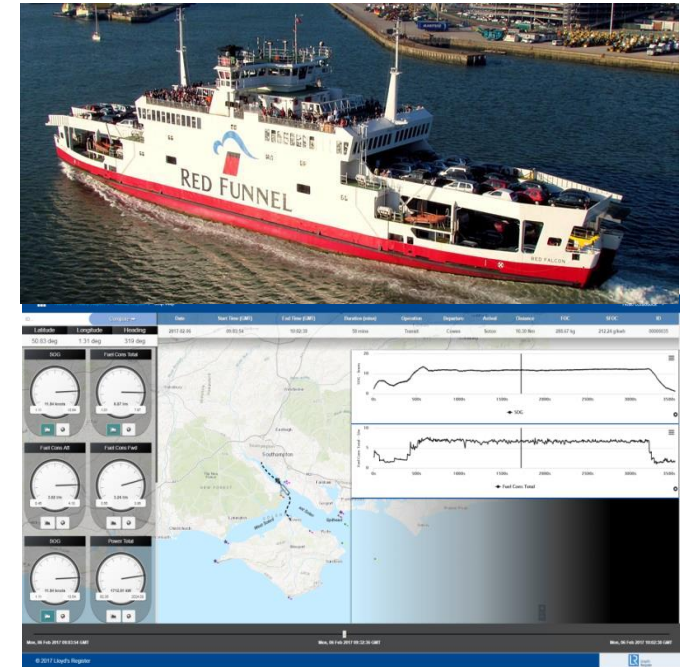
# Red Funnel Ferries

- First company to sail with LR's connected assets platform Fuel Monitoring and Analytics application
- Low cost turn-key data solution that connects to legacy data systems on board
- Transmits all data channels to LR's secure connected assets platform that exists in the cloud
- Clear auditable record of fuel consumption and vessel timings
- ISO 19030 compliant system
- Open access to data

## What Red Funnel are using the system for:

- Optimisation of Voith Schneider propulsion
- Crew coaching tool
- Benchmarking performance across sisters
- Trialling fuel types/additives

## 100m Ro-Ro Ferry / Voith Schneider



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# Cyber Security

Building Resilience through Assurance



## SHIPS

AIS transceivers  
Long Range Identification  
Tracking (LRIT)  
Satellite broadband  
Digital Selective Calling (DSC)

## NAVIGATION

Global Navigation Satellite System (GNSS)  
Global Positioning System (GPS)  
Electronic Chart Display  
Information System (ECDIS)

## RIGS

Dynamic Positioning  
Systems (DP)  
Industrial Control  
Systems (ICS)

## HARBOUR

Automatic Identification Systems (AIS)  
Vessel Traffic Services (VTS)  
Industrial Control Systems (ICS)

## SUPPLY CHAIN

IoT devices  
Movement of goods  
Maintenance  
Sensors  
Automation



Navigation status can be intercepted and data counterfeited



Malware infection via USB plugged into system



Malicious jamming of GPS signals



Connectivity between systems can be compromised



Hackers gaining access to the network via third parties

## Cyber Security: Building resilience against new risks

### 1: Threat intelligence

Dedicated research and innovation team to inform clients with up to date threat intelligence

### 2: Governance, risk and compliance

Security services for managing corporate governance, risk management and compliance

### 3: Security testing

Threat intelligence led testing, red teaming, penetration testing and continuous scanning

### 4: Training and strategy

Customised cyber strategy that aligns people, processes, and technology with enterprise business priorities

### 5: Managed security services

An extension of our clients' security operations team

### 6: Incident response

Immediate response in the event of a cyber breach

## LR Cyber Security Portfolio

## Assurance and Classification for Cyber Security

### 1: Cyber Security Notations

Cyber security notations to a ship and its operator based on technical controls and governance.

### 2: Smart System Components Type Approval

Hardware certification, awarded to the manufacturer, intended for use in 'smart' systems on ships.

### 3: SCA Cyber Security

SCA is a certificate we give to software based on the QA processes applied during its development. SCA is made up of 'modules' which are assessment criteria for certain software or aspects of software.

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