Integrity Management Data Visualisation

North Sea Oil and Gas Asset Maintenance

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CNR International

Introduction

Mechanical and Corrosion Damage Reports (MCDRs) are processed procedurally upon anomaly detection. Data about the anomaly is recorded such as the associated risk, affected component types, damage type and location. The anomaly is monitored before being scheduled for repair, from which a target liquidation date is set according to an assigned priority. Here liquidation means the removal of the associated risk through repair or replacements.

Due to the limited number of personnel permitted on a platform at one time along with the high average workload associated with liquidation, often they are generated at a higher rate than they can be closed. Therefore MCDR liquidation performance is crucial in risk management. Staff requested visualisation tools to allow the monitoring of performance and understand insights to aid in planning repair work.

Project Aim

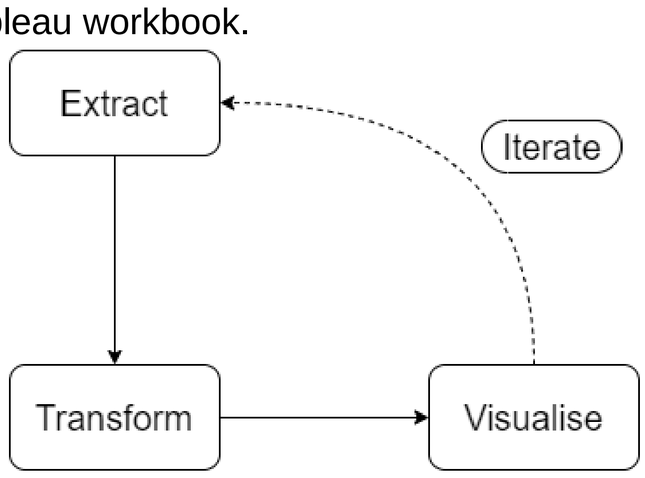
The aim of this project was to provide visualisation tools to enable staff to monitor MCDR liquidation performance, along with illustrating trends and factors related to MCDR liquidation performance.

The following objectives were also stated:

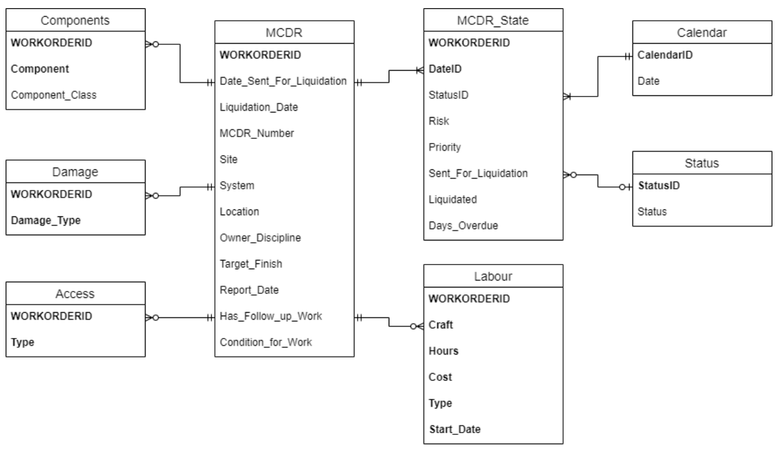
1. Extract and arrange MCDR data so it can be analysed.
2. Use this data to understand factors which influence liquidation performance.
3. Display insights and performance measures through dashboards, designing alongside feedback from staff.
4. Document the functionality of the solution.
5. Evaluate and test.

Methods

An iterative methodology was adopted where required data was extracted from the database, transformed into the required format using the R programming language, then visualised and used to create dashboards in a Tableau workbook.

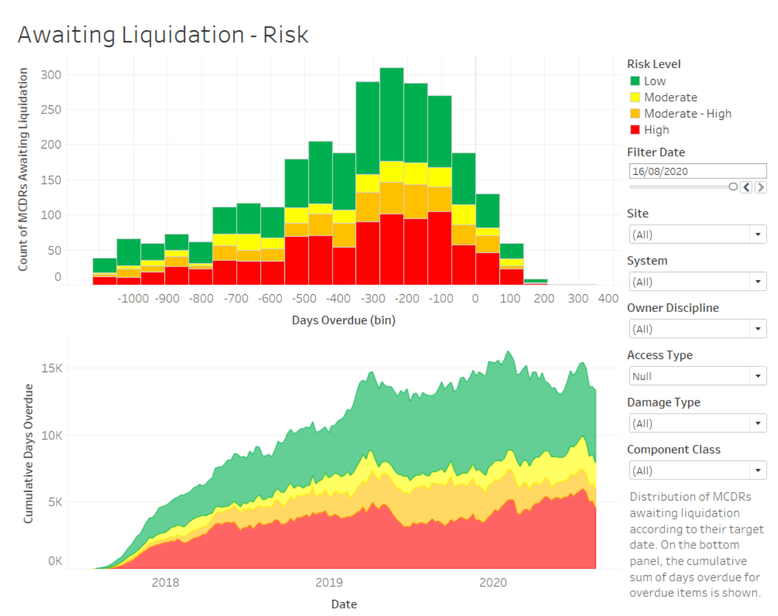


Figures and Results

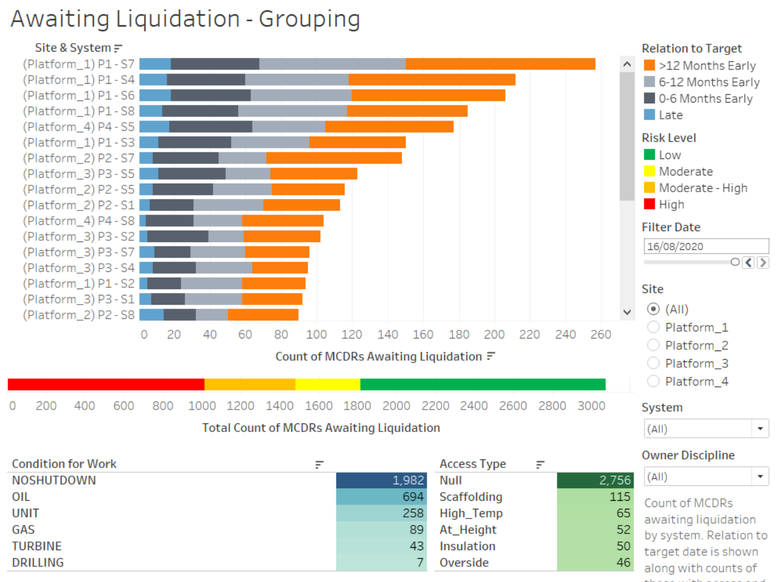


Code to extract relevant data from the database and arrange it into the format shown above was developed. This was designed to be reproducible and accommodate data updates.

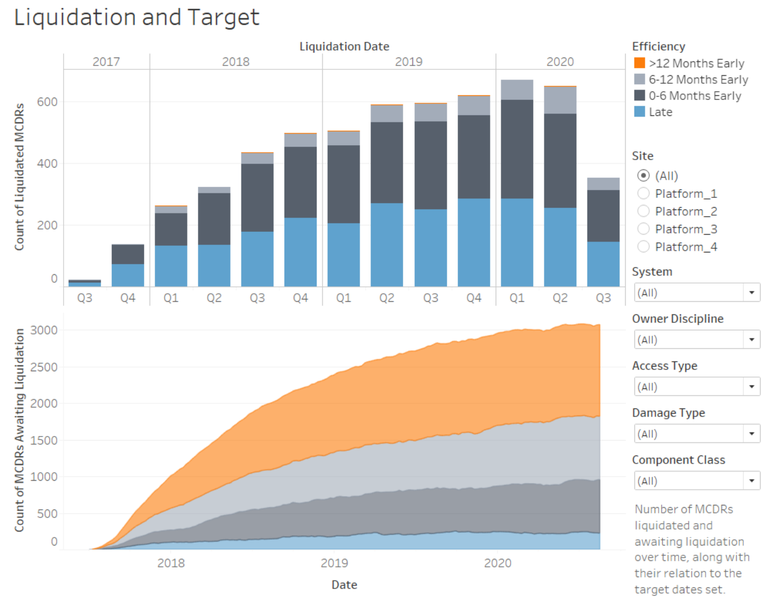
Four dashboards were created to show past and present liquidation performance, which was characterised by the relation of the liquidation date to the target finish date, and also by a “sum of overdue time” parameter.



The following dashboard was also created to identify groups of similar MCDRs awaiting repair according to platform, system and requirements for work such as various shutdowns or access to scaffolding. Interactivity was introduced to visual elements by text icons upon hovering and clicking to filter.



Conclusion



Staff responded positively to the dashboards in feedback forms following a demo, finding them useful for monitoring liquidation efficiency and identifying trends. Thus the aim of the project was fulfilled.

The extraction, transformation and visualisation components of the solution were ensured to convey accurate data through testing and comparing with the data source. Documentation was written on how to update the dashboards. The second objective of the project was met, although unlike the others it was not completed to the degree originally intended. This was because of some difficulties with the data biases in the database due to it being adopted fairly recently in mid-2017 and only containing data beyond this date, along with the storage format resulting in missing data values not always being able to identified. As such the data mining aspect of this project was limited in success.

In the future this project may be expanded upon by extracting data from historical records which are stored in Excel files. This may be incorporated into the dashboards to show trends over a greater time span along with allowing data mining to take place where it was infeasible using the database data alone. Also the dashboards may be deployed on a server and the updating process may be automated.

Acknowledgments

I would like to thank my supervisors for their support and guidance throughout this project. I would also like to thank CNR International (U.K.) for the opportunity to undertake the internship, and The Data Lab for funding my MSc scholarship.

**Simulated data shown*

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