Cloud Native Collaborative Well Construction Planning Using Big-Data From Offset Wells to Maximize Results

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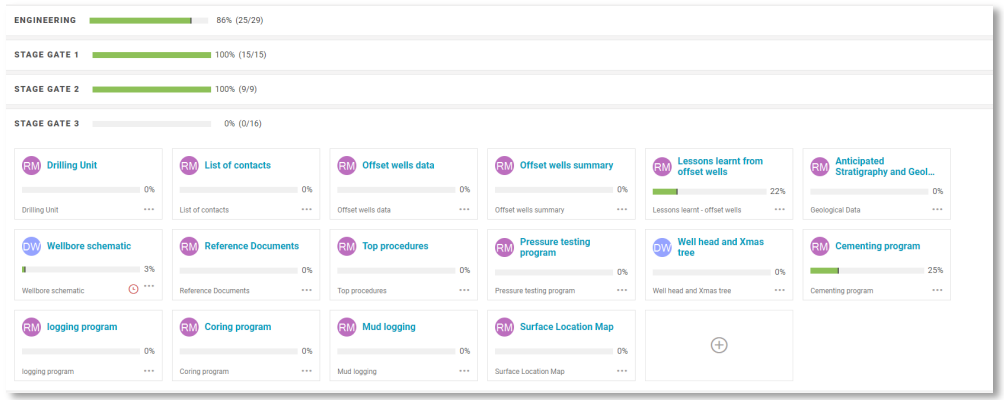
Moving more. Moving the future.

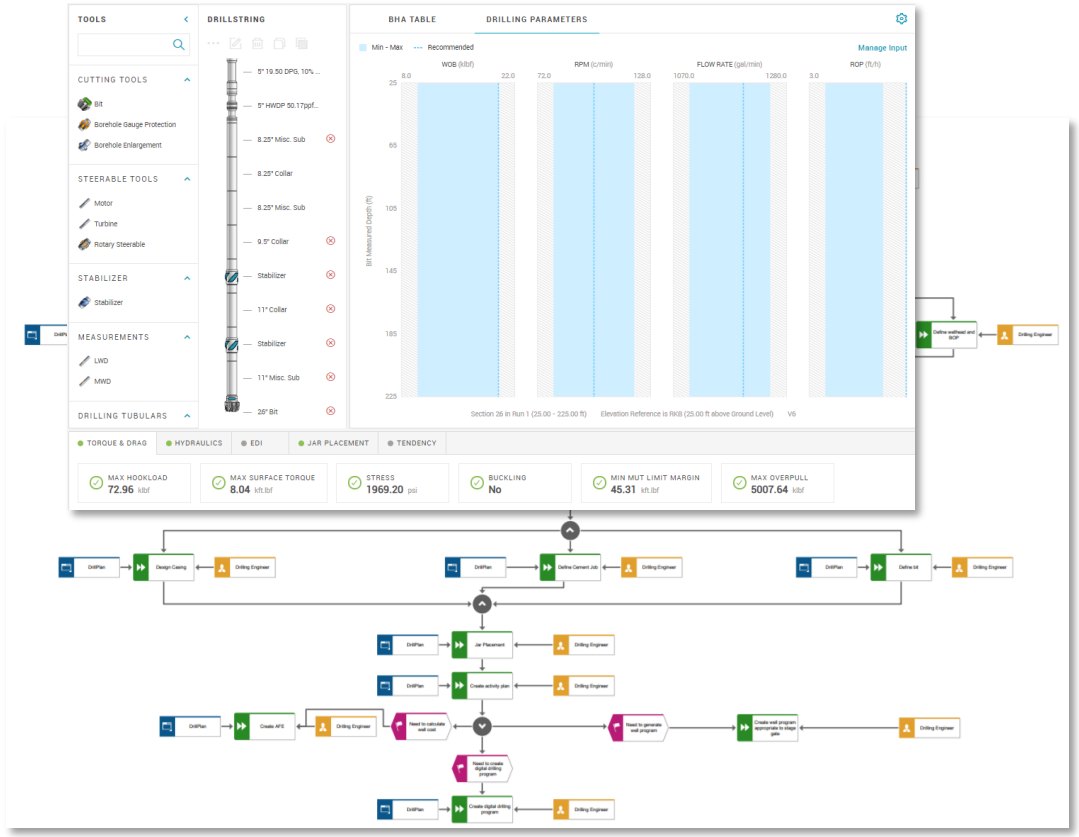
OMV Pilot

- Robust evaluation of DrillPlan
  - Engineering
  - Report Generation
  - AFE
  - Offset Well Analysis
- Defined use cases created for evaluation
- Evaluation of ability import offset well data from IDS DataNet to DrillPlan
- Working with real data from OMV International asset

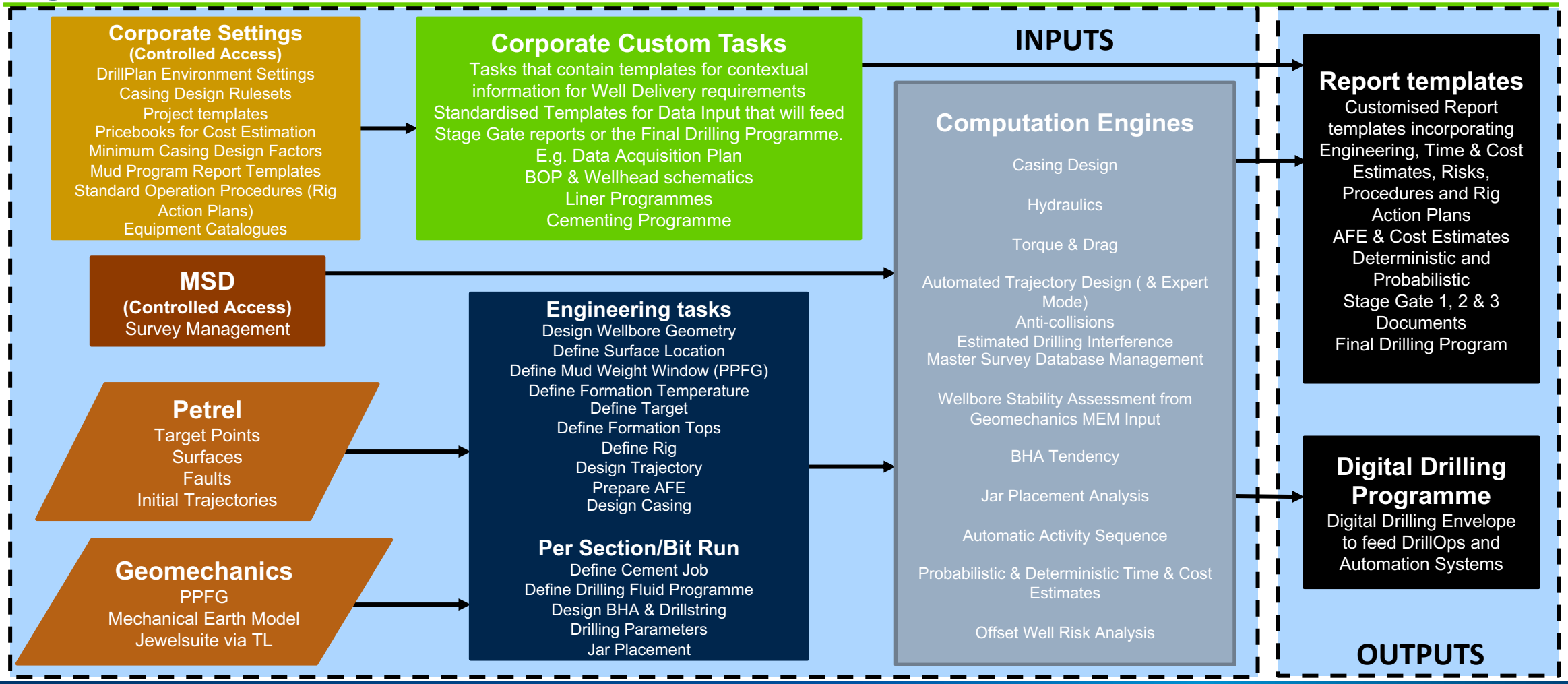
Customisation

- OMV Workflow mapped out
- DrillPlan workflow created in-line with OMV Stage Gate process
- Report templates created
- OMV Load cases created
- Casing catalogue items added
- MSD replicated



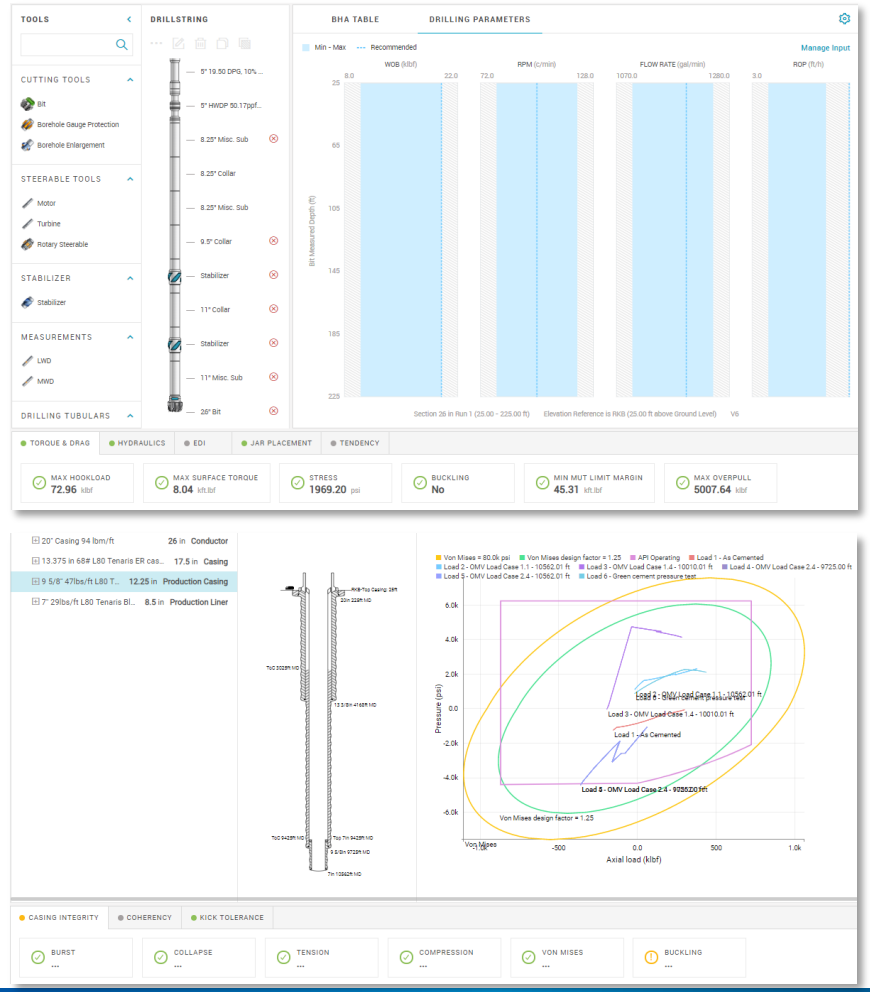


High Level Process Map



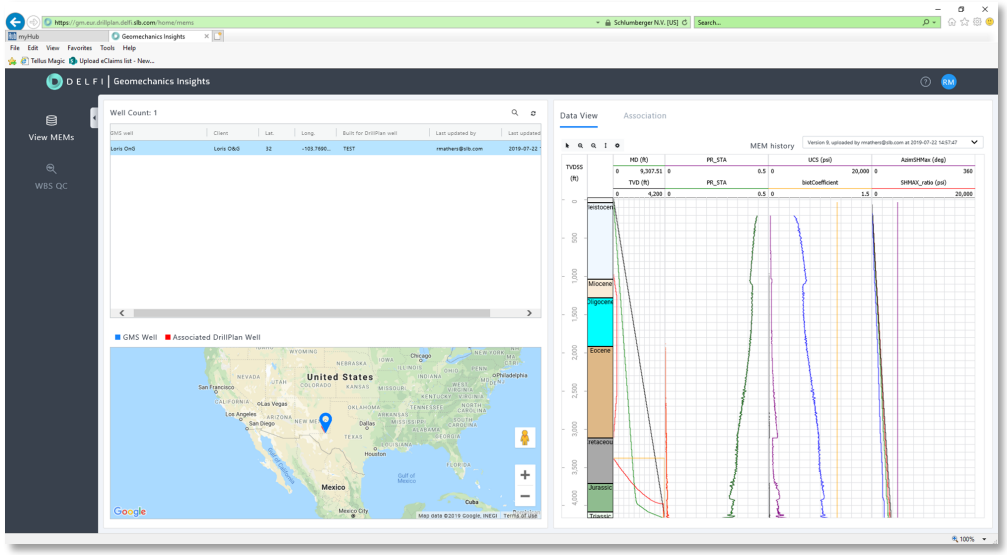
Engineering

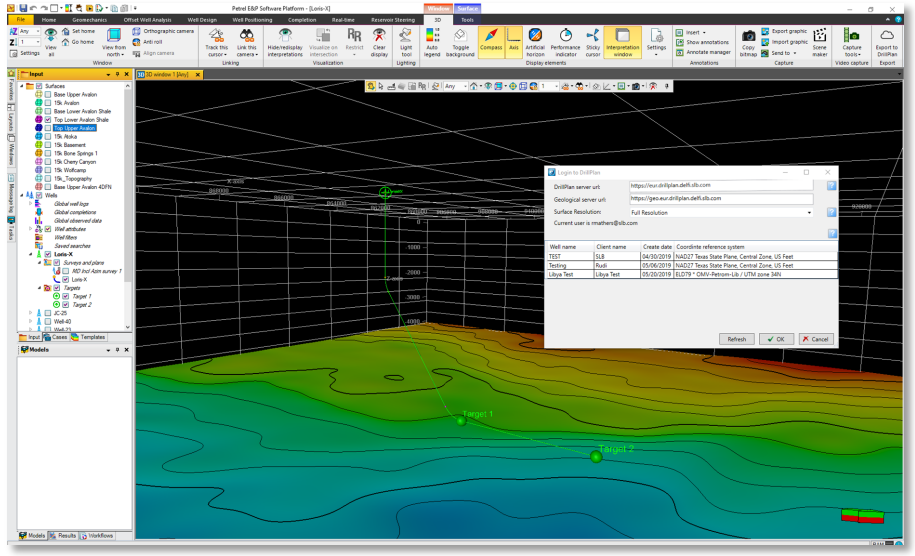
- Robust evaluation of DrillPlan
- OMV Casing Design Loads Applied as Corporate Rule Sets
- Custom catalogues for OMV Specific Casings & Tubulars
- AEA allows for instantaneous update of engineering calculations, quick and easy to see impact of changes made
- Drillability checked automatically by analysing expected load in worst case scenario and checked against well or rig limitations (PPFG, Surface & Downhole equipment)
- Unlimited Cloud computing power allows DrillPlan to calculate every possible combination of each parameter range, every 100ft, along the wellbore



Petrel & Geomechanics Link

- Ability to push geological context information to DrillPlan from Petrel
  - Surfaces, faults, targets and trajectories
  - Plan wells in context
- Ability to push MEM for well/Field to DrillPlan
  - Provides WBS analysis for trajectory design





Offset Well Data Transformation

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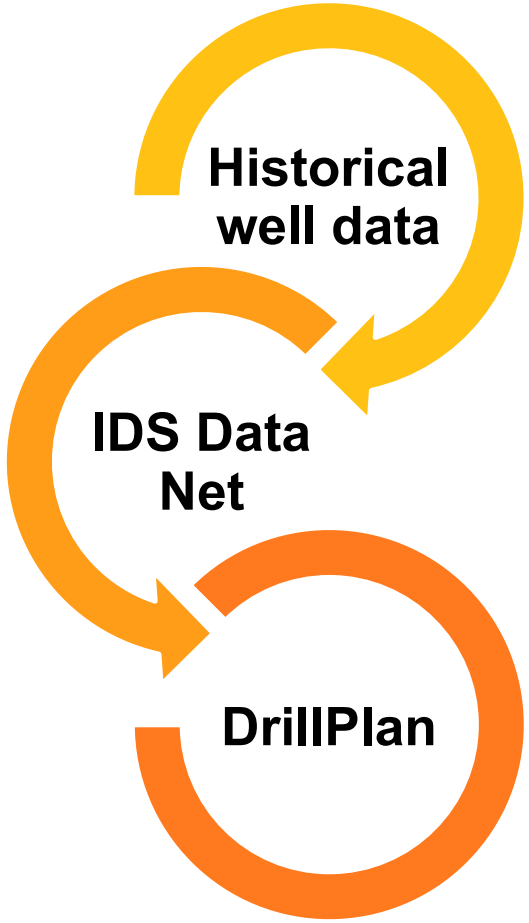
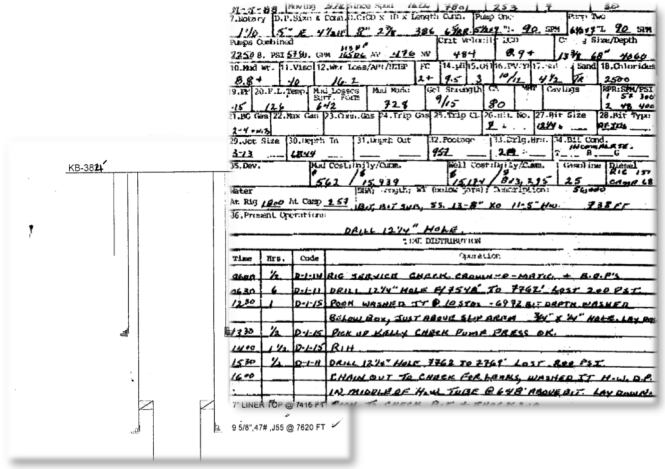
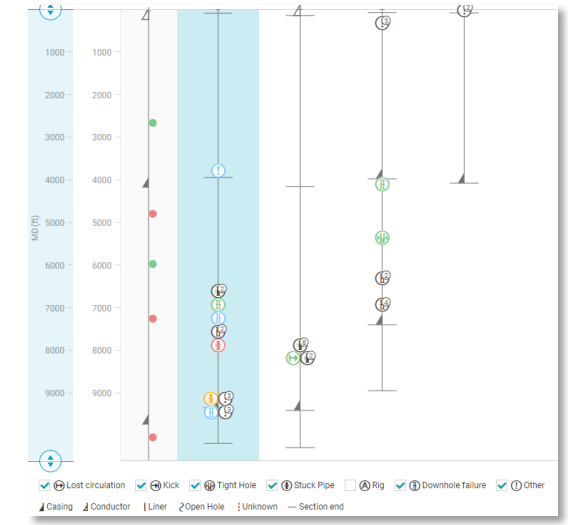




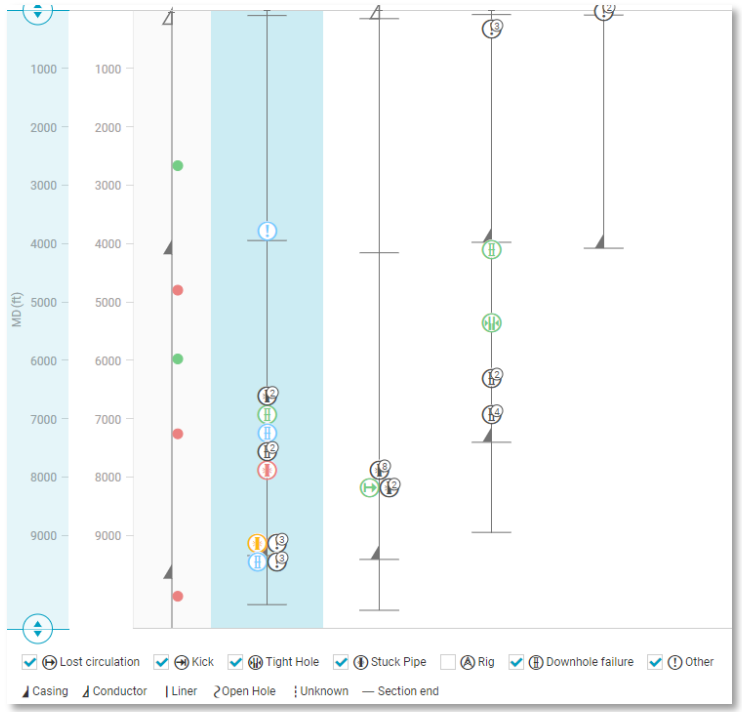
Offset Well Analysis

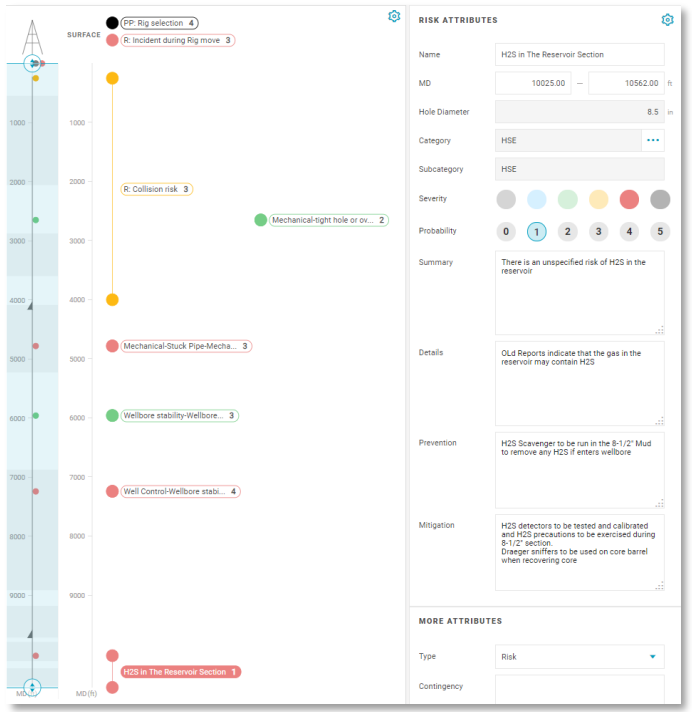
- Robust evaluation of DrillPlan
- Use of offset well data in meaningful way
- Time reduction from paper copies
- Information used in activity plan and AFE calculation
- Automatic Analysis of NPT data in Offset Wells, categorized and presented to the user for incorporation into their well timings and cost
- Automated Performance analysis of offset well timings for use in probabilistic well time analysis

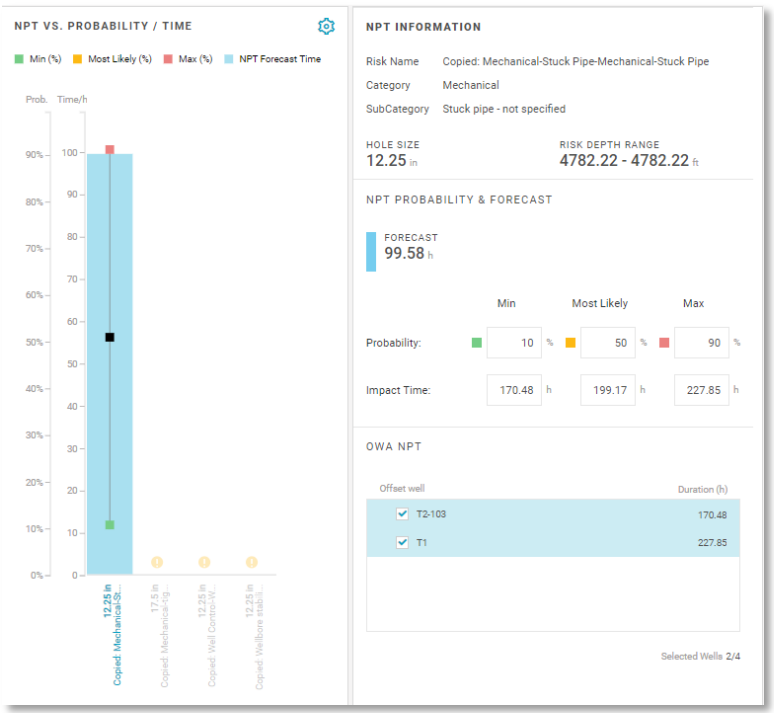


Risk Analysis

- Offset well risks imported into DrillPlan
- Probabilistic distribution of risk NPT calculated







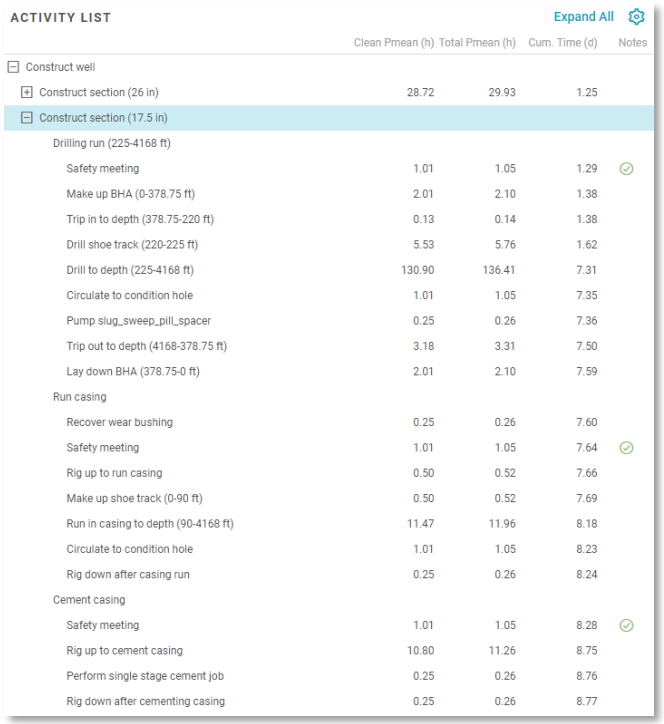
Risk Analysis

- Export of risk analysis in DrillPlan fed into OMV Risk Register
  - Use of Macro
  - Boston Square populated

			Pre-Mitigation			Post-Mitigation								
Risk No.	Risk Description	Effect	Prob'y of Occur (1-5) Init	Impact of Occur (1-5) Init	Initial Risk Grade (H,M,L)	Prob'y of Occur (1-5) Final	Impact of Occur (1-5) Final	Final Risk Grade (H,M,L)	Phase Title	Risk Manager	Risk Owner	Mitigating Action	MA Status	Comments
			PROJECT MANAGEMENT											
			PERMITS											
			TENDERS, CONTRACTS, LONG LEADS											
			PLANNING & PREPARATIONS											
			DESIGN (GATE-2 SUBMISSION)											
			Rig Move											
			OPERATIONAL RISKS - INSTALLATION OF RIG, DRILLING 17 1/2" HOLE & INSTALLATION OF 13 3/8" CONDUCTOR											
1	Mechanical-tight hole or overPull-Mechanical-tight hole or overPull	6.0 hrs This risk is copied from Well 33 at 11:18, Jul 2 2019 by Mark Honey	2	2	L	2	2	L	Design & Planning	WM	DW		Open	Attempted to P/U string and experienced overpull. Wiper Trip to clean the hole.
			OPERATIONAL RISKS - DRILLING 12 1/4" HOLE & INSTALLATION OF 10 3/4" CASING											
2	Mechanical-Stuck Pipe-Mechanical-Stuck Pipe	38.0 hrs This risk is copied from Well 33 at 11:17, Jul 2 2019 by Mark Honey	3	4	M	3	4	M	Design & Planning	WM	DW		Open	Attempted to P/U string and experienced overpull. Pulled to a max of 20,000lbs overpull and worked string. Jar until pipe free
3	Well Control-Wellbore stability-Wellbore stability	6.0 hrs This risk is copied from Well 51 at 11:18, Jul 2 2019 by Mark Honey	4	4	H	4	4	H	Design & Planning	WM	DW		Open	Well Control Issues, Increase MW and monitor well
4	Wellbore stability-Wellbore stability-Wellbore stability-Wellbore stability	6.0 hrs This risk is copied from Well 40 at 11:18, Jul 2 2019 by Mark Honey	3	2	M	3	2	M	Design & Planning	WM	DW		Open	Well Control Issues, Increase MW and monitor well
			OPERATIONAL RISKS - DRILLING 9 1/2" HOLE & INSTALLATION OF 7 5/8" CASING											
			OPERATIONAL RISKS - DRILLING 6 3/4" HOLE & INSTALLATION OF 5 1/2" LINER											
5	H2S in The Reservoir Section	There is an unspecified risk of H2S in the reservoir	1	4	M	1	4	M	Design & Planning	WM	DW	H2S detectors to be tested and calibrated and H2S precautions to be exercised during 8-1/2" section. Draeger sniffers to be used on core barrel when recovering core	Open	OLd Reports indicate that the gas in the reservoir may contain H2S
			OPERATIONAL RISKS - Run ESP completion											

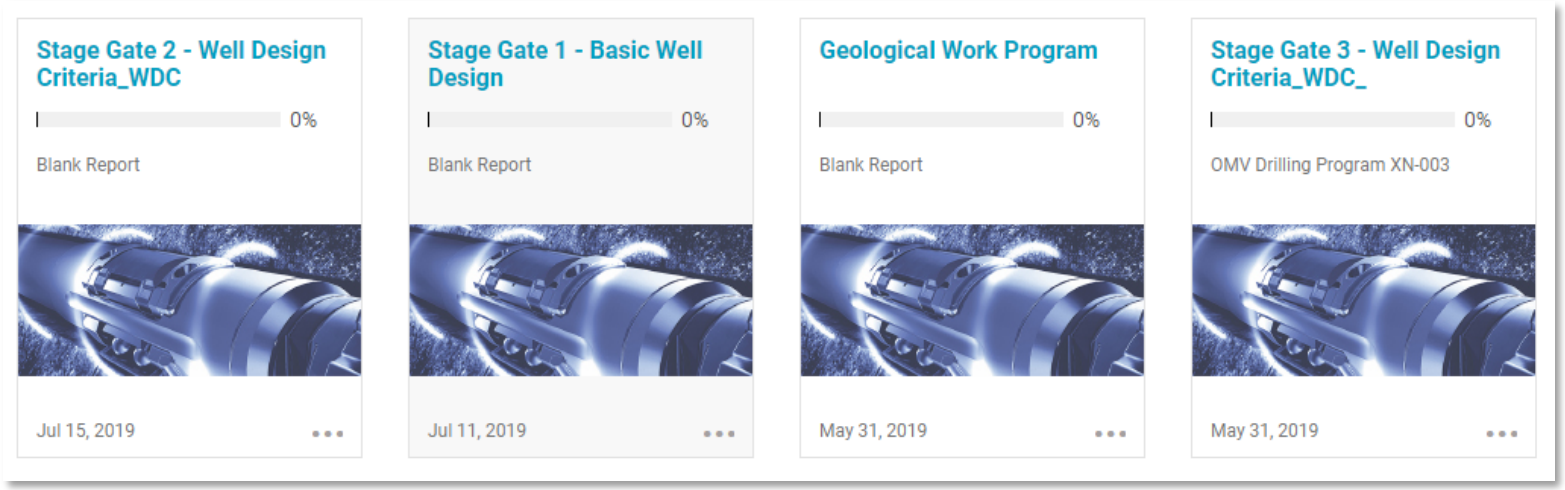
Activity Plan and AFE

- Automatic Activity List built from Wellbore Geometry and Engineering Tasks
- Automated AFE, updates automatically based on new offset well data or changes to well activity.
- Controlled Access to AFE & Price Book
- Probabilistic or Deterministic Time & Cost automatically updates with new offset data or changes to proposed Schedule
- Manual adjustments possible if required



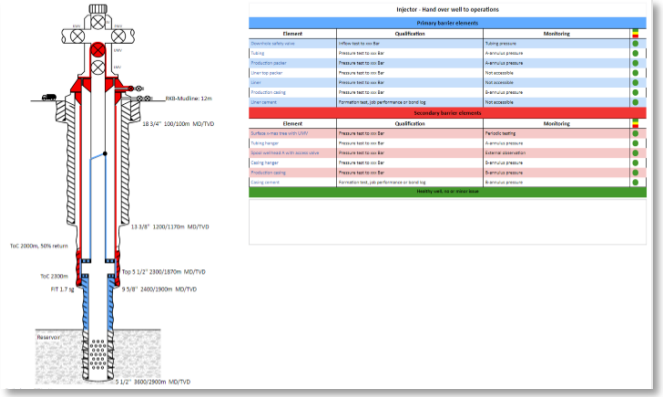
Standardised Reporting

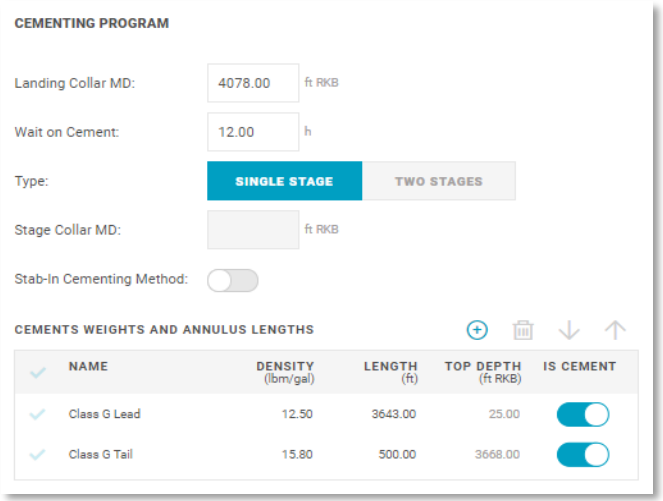
- Ability to create all stage gate documentation, G&G and Final drilling program in one place in one-click
- OMV Stage Gate reports replicated as well as Geological Work Program
- DrillPlan workflow allows for reports to be updated simultaneously and for content to be shared across reports reducing manual input



Current Limitations & Future Developments

- Casing running & cementation
- Wellbarrier diagrams
- Completions
- Digital Visualisation cube
- Notifications
- API gateway – link to project planning
- Data residency – Azure stack





Conclusion

- User friendly application
- Customisable
- Project management tool
- Potential to replace multiple applications
- Extracted real value from offset well data
- Efficiency gains
  - Instant validation of engineering
  - Workflow and report templates
- Potential to include more engineering
- Multi-disciplinary access

"I was able to create a new well and fill in all the required information to pass over to my colleague to work on the trajectory design in around 15 minutes"