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SPE-192627

Digitalization of a Giant Field

The Rumaila Story

Yaser Salman – ROO, Denis Gauder – IPCOS, Bill Turnbull - BP

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- Introduction
 - Rumaila key figures
 - Objectives and priorities for digitalization
 - Roadmap and timelines
- Components of digitalization
 - Sensors and data transmission
 - Data management and system integration
 - Exception-based surveillance platform
- Conclusion and lessons learnt

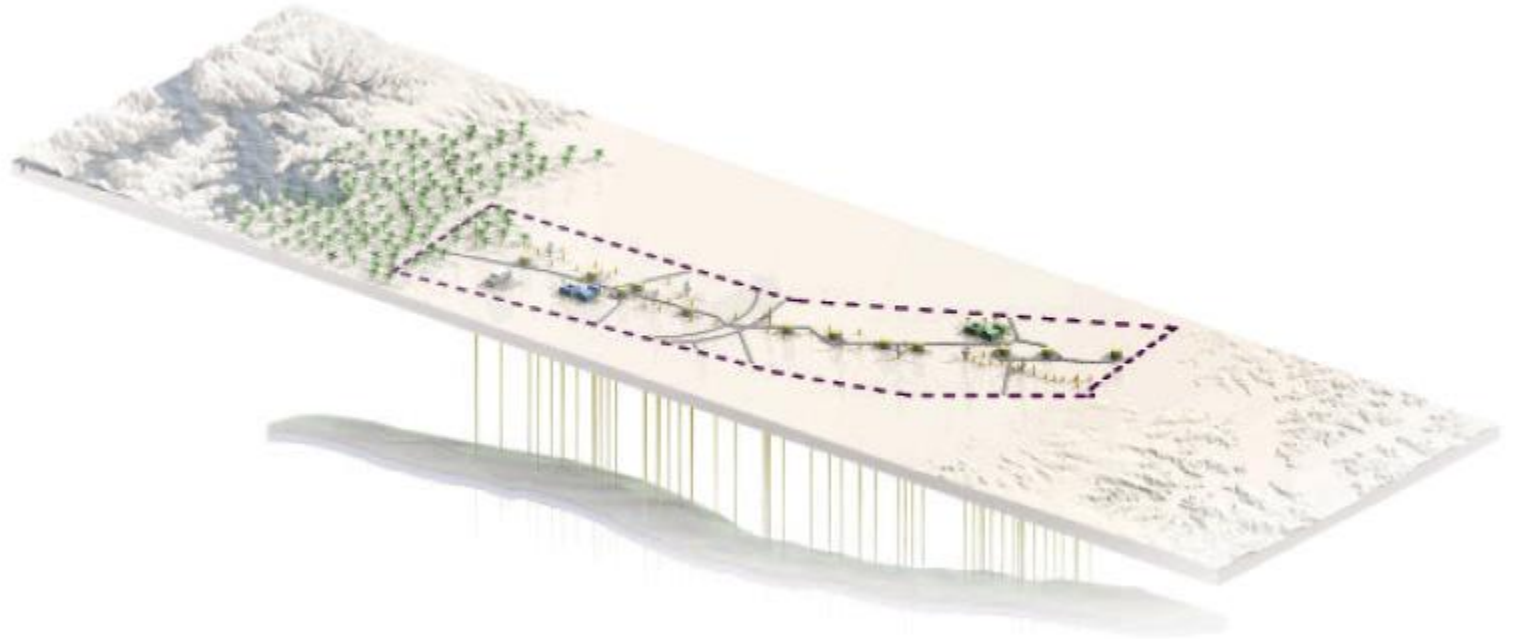
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RUMAILA KEY FIGURES

- 1100 wells
- 14 DGS's and 9 CPS's
- 1.5 MMbbls/d
- 8000 staff
- 3rd largest field in world
- Field spans 80km by 20km



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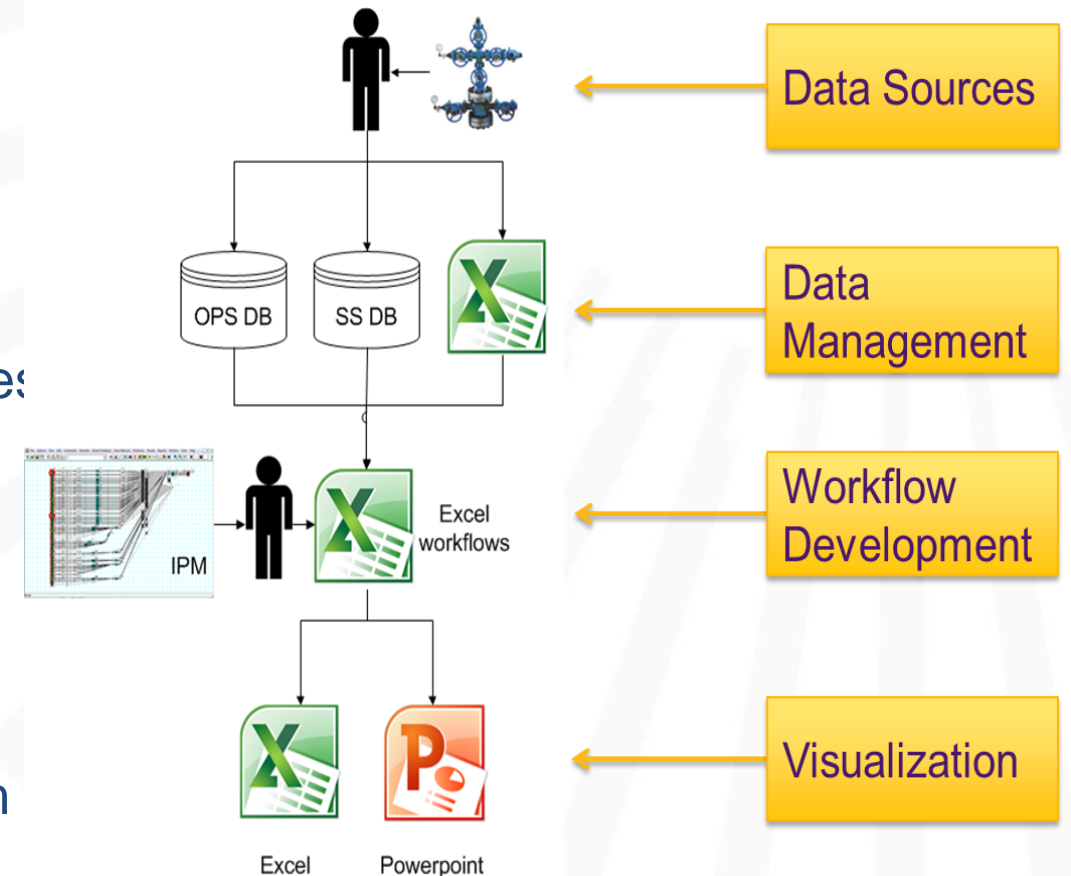
OBJECTIVES AND PRIORITIES OF DIGITALIZATION

The main objectives

- More frequent and accurate well data
- Reduced losses from ceased wells and SSV closures
- Improved system optimization
- More efficient utilization of the workforce and resources

Priorities

- Define the **essential data** to be recorded
- Setup reliable and manageable **data transmission**
- Setup central **data storage and organization** system
- Simple **data analytics** for opportunity identification

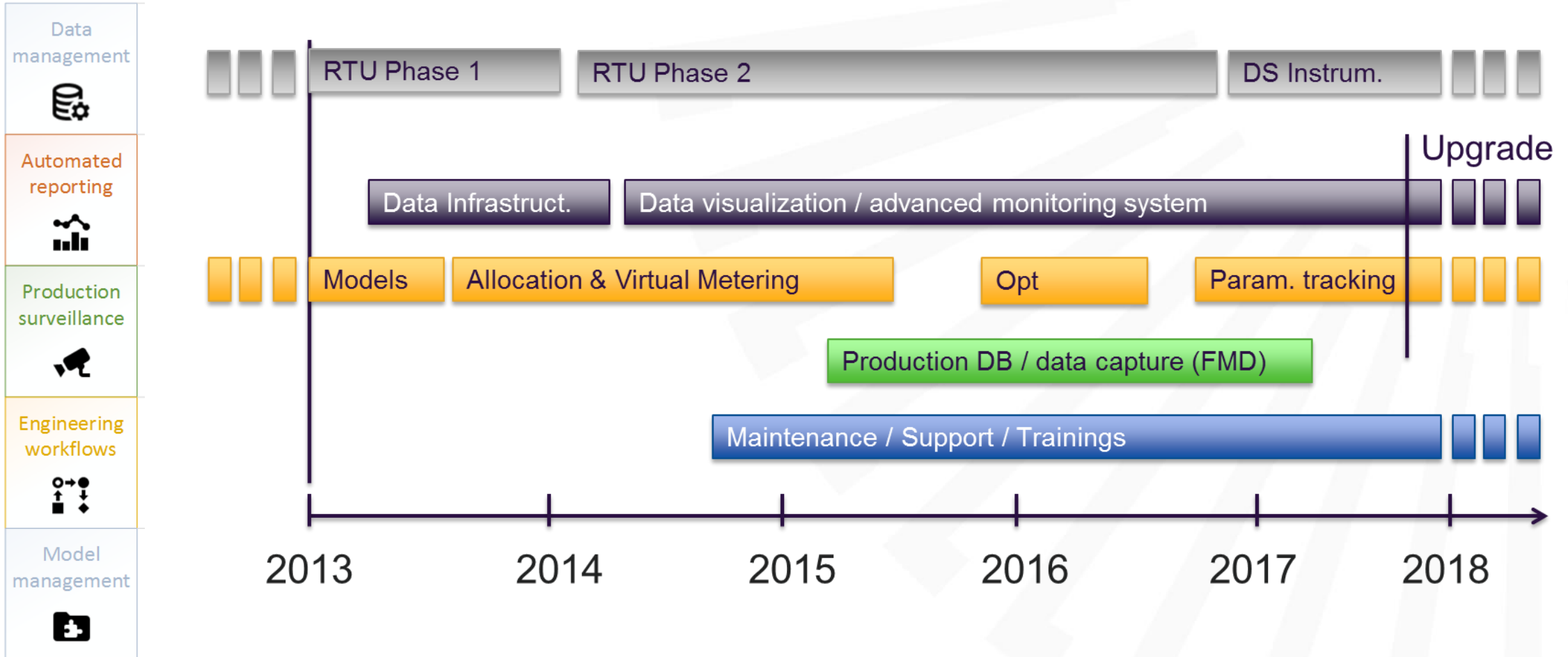


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ROADMAP AND TIMELINES



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Challenges

- High temperatures (+50degC) and harsh conditions (sand, dust, wind)
- No power supply available
- No data transmission infrastructure
- Large number of wells and facilities

Final hardware solution

- Pressure and Temperature wireless transmitters
- Remote Telemetry Unit (RTU)
- Battery system and a solar panel as power supply



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DATA INTEGRATION

- Installation of databases for high and low frequency data
- Automated system maintenance for addition of new equipment
- Data model for intuitive and exhaustive data access
- Data integration between high and low frequency production data

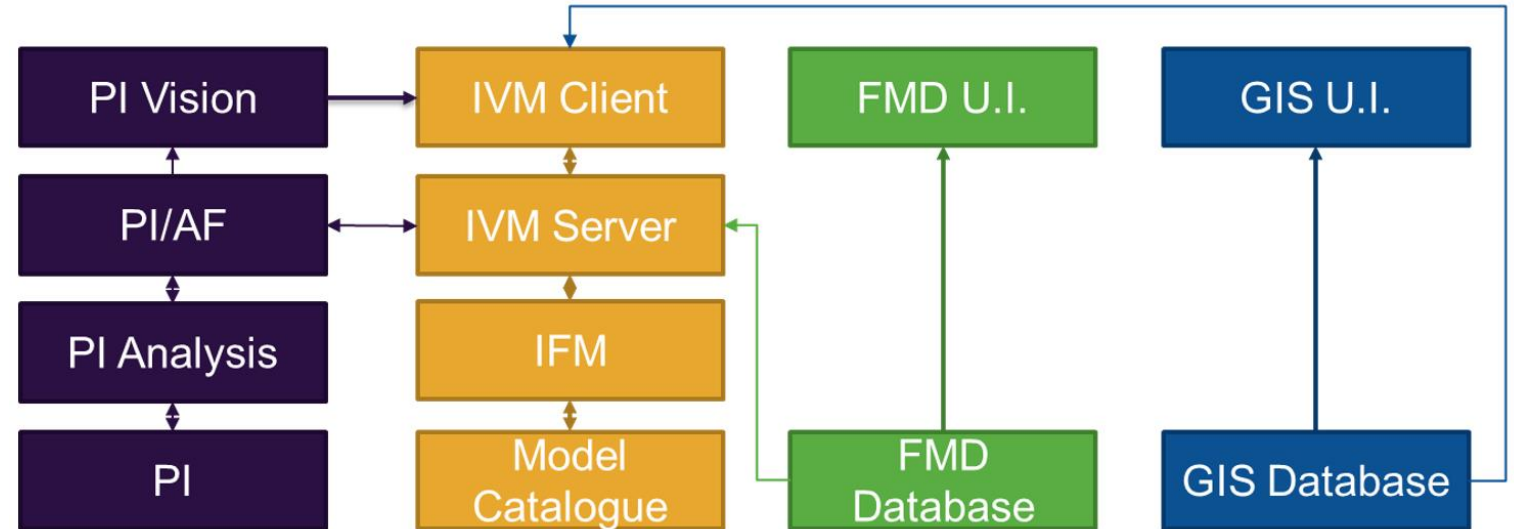
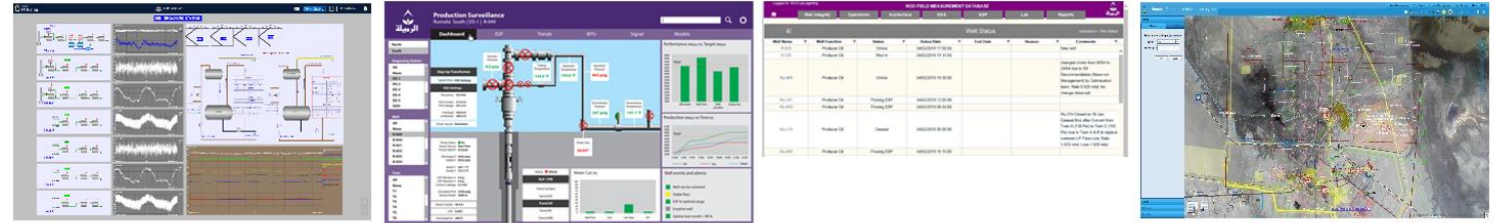


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Integrated system for

- Well and reservoir management
- Facilities and process monitoring
- Geographical information
- Manual data capture



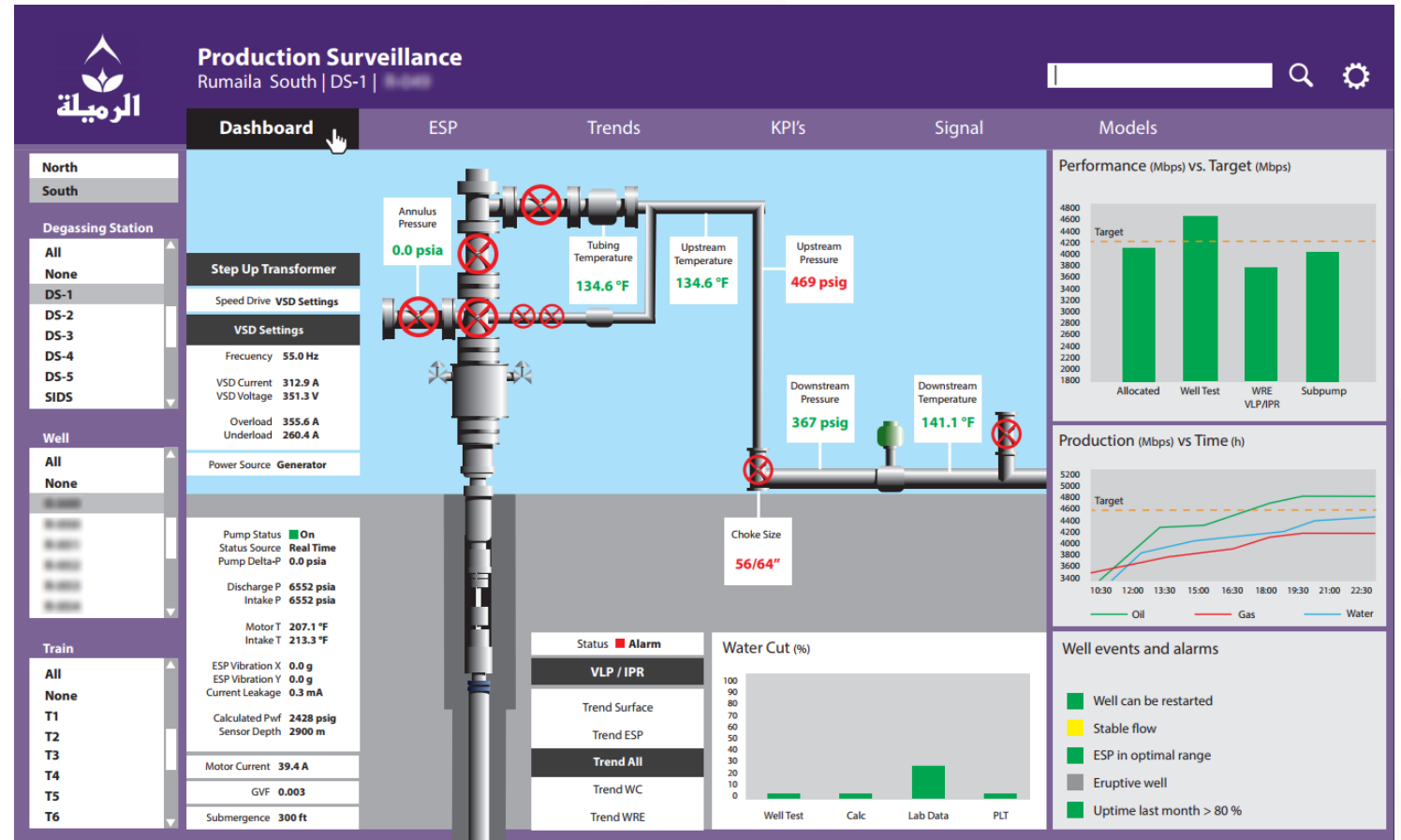
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SURVEILLANCE PLATFORM

- High and low frequency data
- Well setup and flow path
- Model results
- Well routing
- Production targets
- Data quality indicators
- Alarm configuration



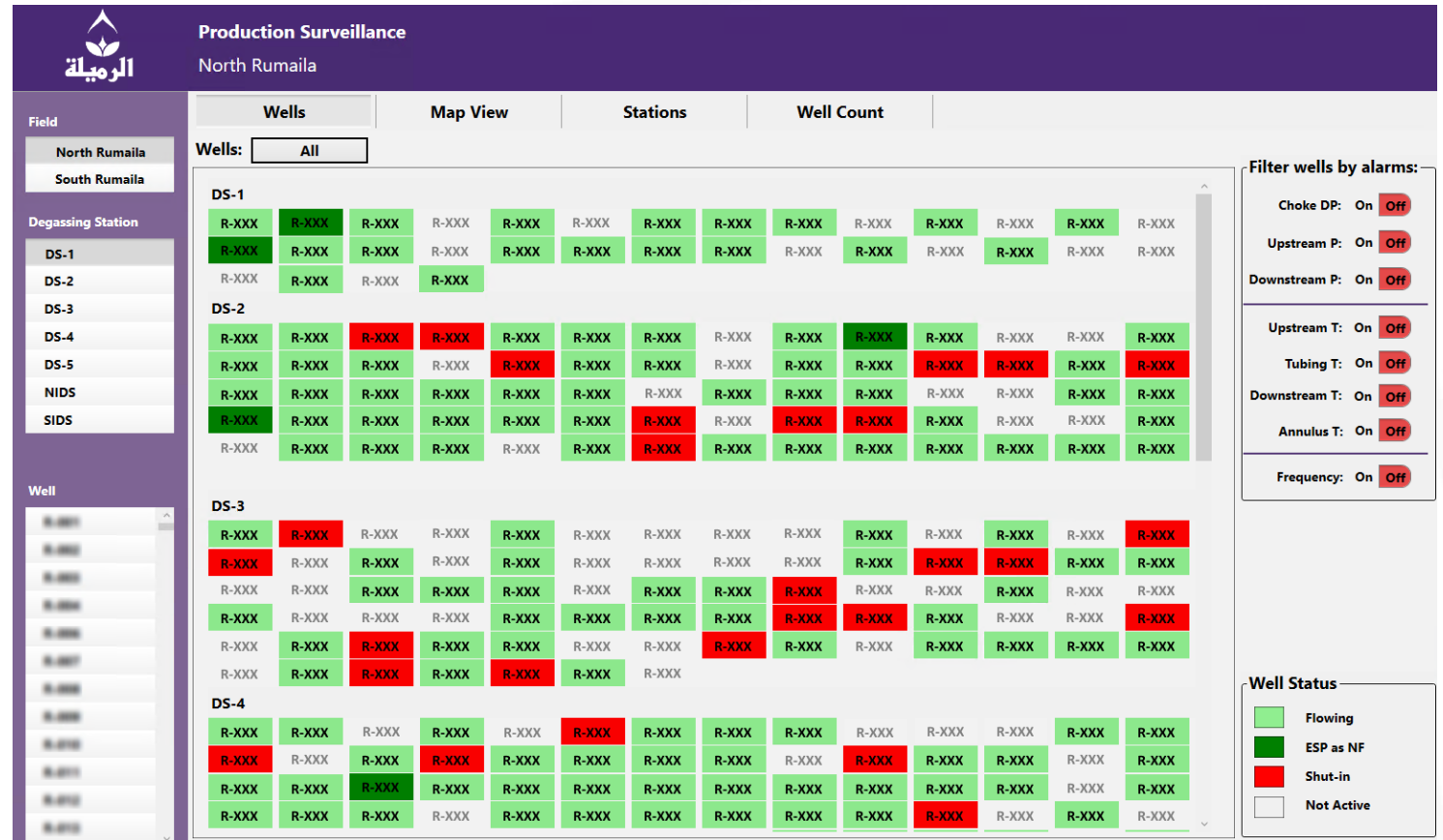
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EXCEPTION-BASED SURVEILLANCE

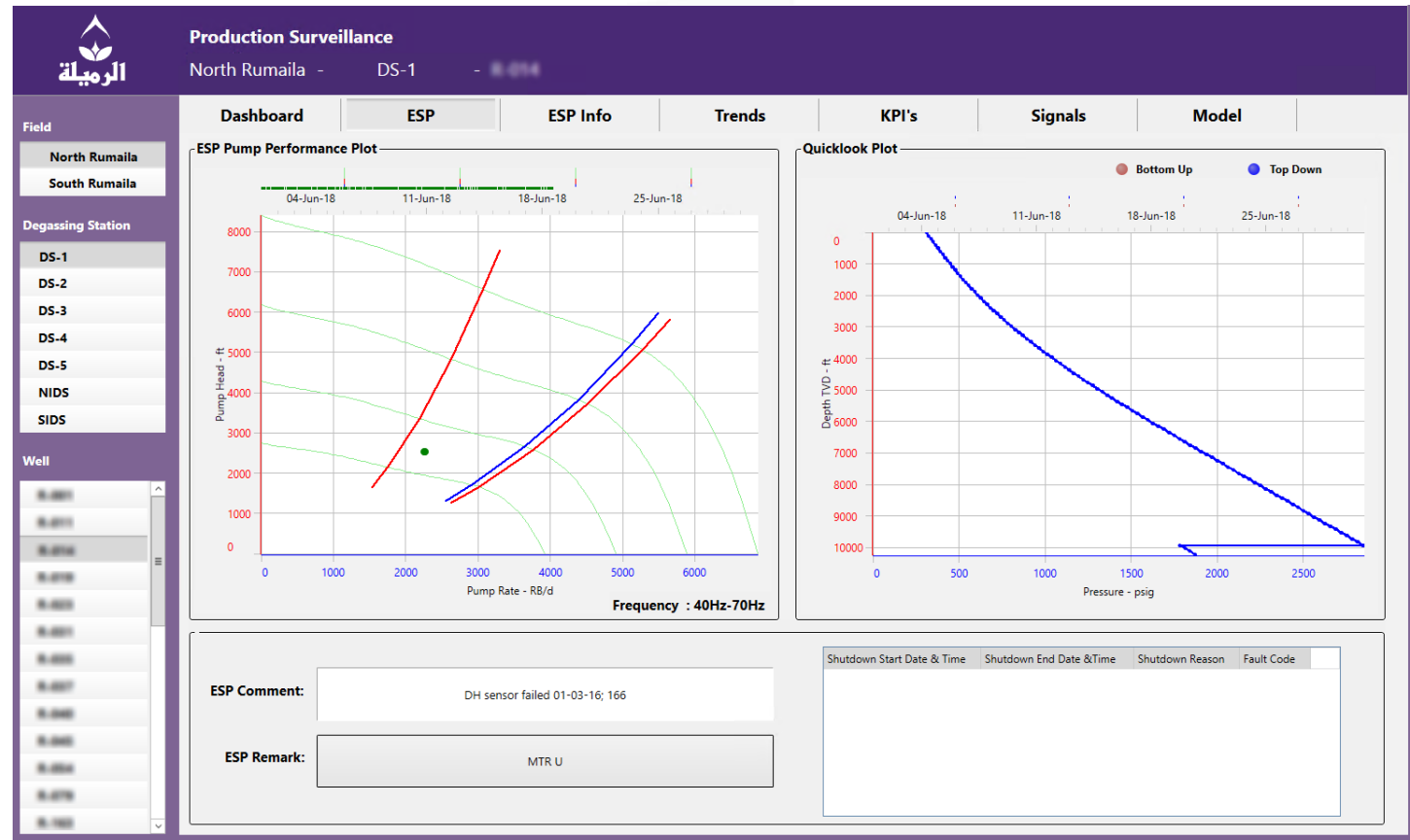
- Crucial feature due to field large size
 - Simple dashboards with different conditions
 - Integration with alarms
 - Action assignment to appropriate personnel
- Detection of well closure in 2 hours VS several days!



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ESP ADVANCED SURVEILLANCE PLATFORM

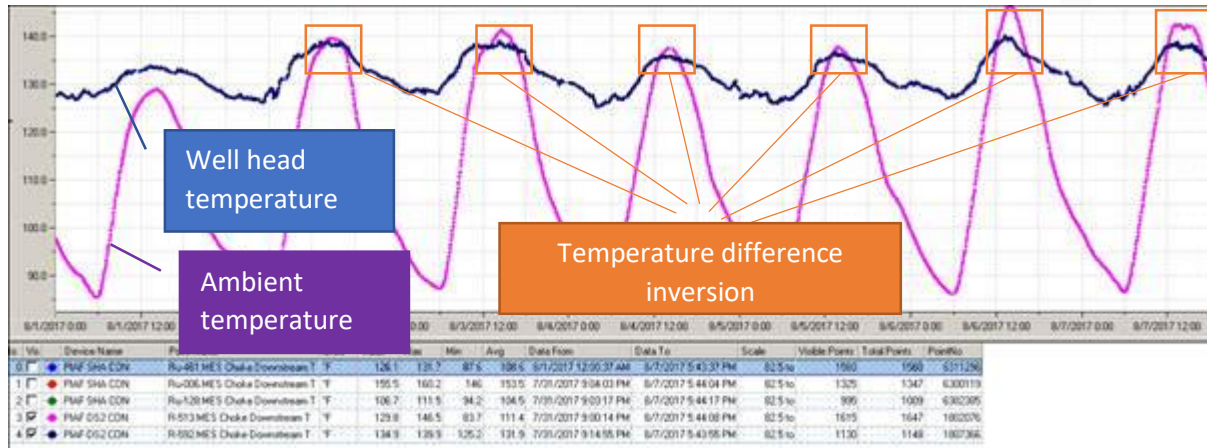
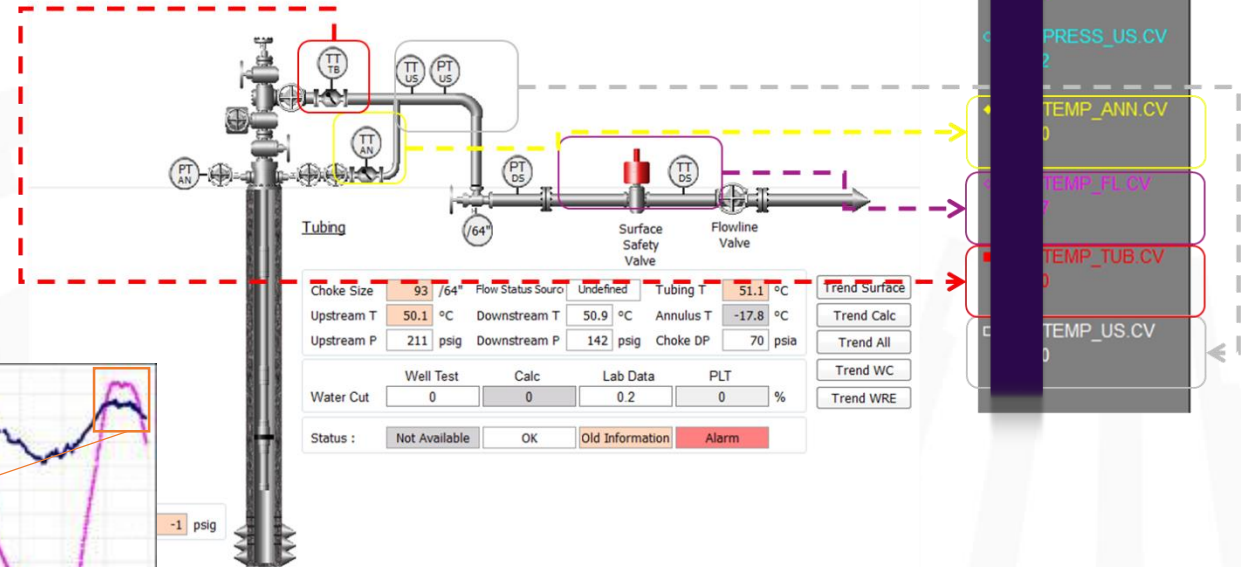
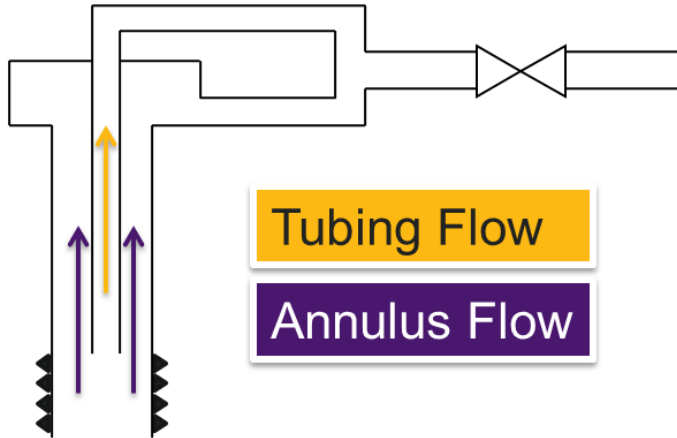
- Model generated performance curves
- Pressure profile visualization
- Comments and remarks capture interface
- List of shutdowns and reason codes
- Direct access to hardware and installation details



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MODEL BASED SURVEILLANCE



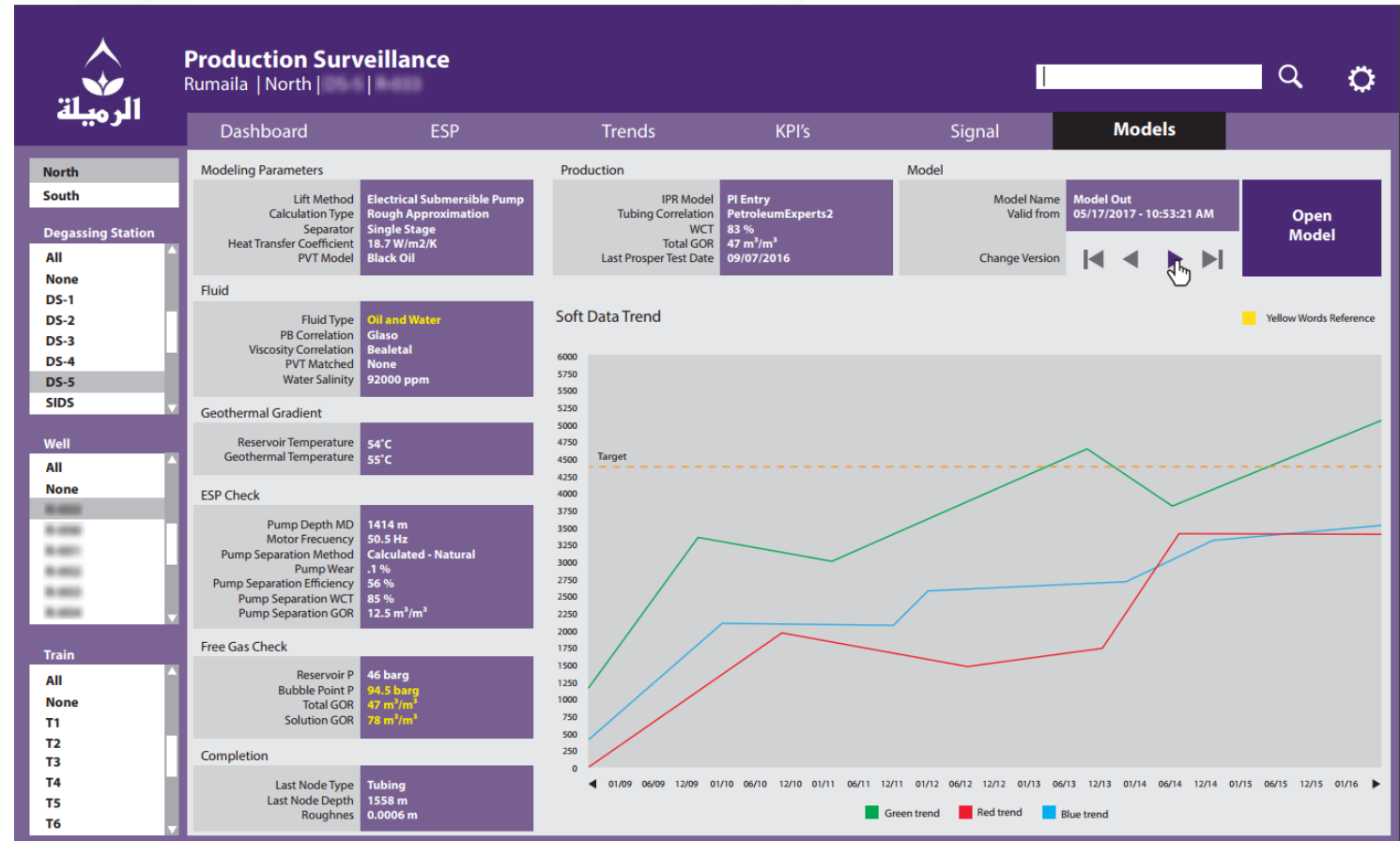
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MODEL QUALITY MONITORING

Dependency on model accuracy has increased → need for continuous quality check

- Follow-up of model parameters through time
- Detection of parameters inconsistency against other wells
- Direct access to different model versions



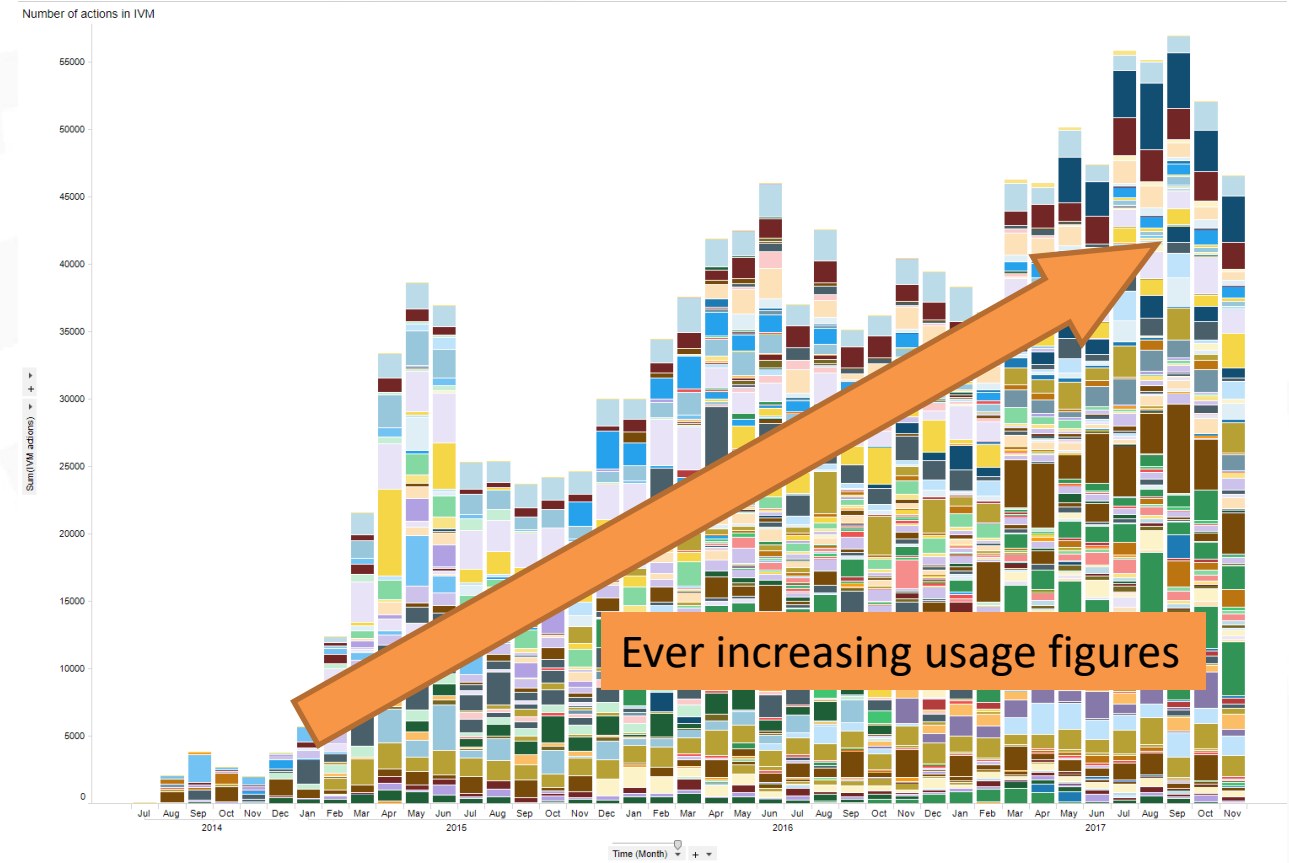
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KEY FACTORS INFLUENCING SUCCESS

- Start from the requirements, not the software capabilities
- Involve all stakeholders from the start
- Develop in-house champions
- Plan for appropriate training
- Invest in sustainability
- Keep DOF evolving



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CONCLUSION

- Digitalization of Rumaila has transformed the operations
 - Better safety and efficiency
 - ESP run life extended, well shut downs reduced
 - Improved well, reservoir and facilities management
- Different activities in parallel over 5 years
 - Sensors and data transmission
 - Data management
 - Engineering workflows
 - Visualization and technical dashboards
- Successful example of digitalization of large and mature fields

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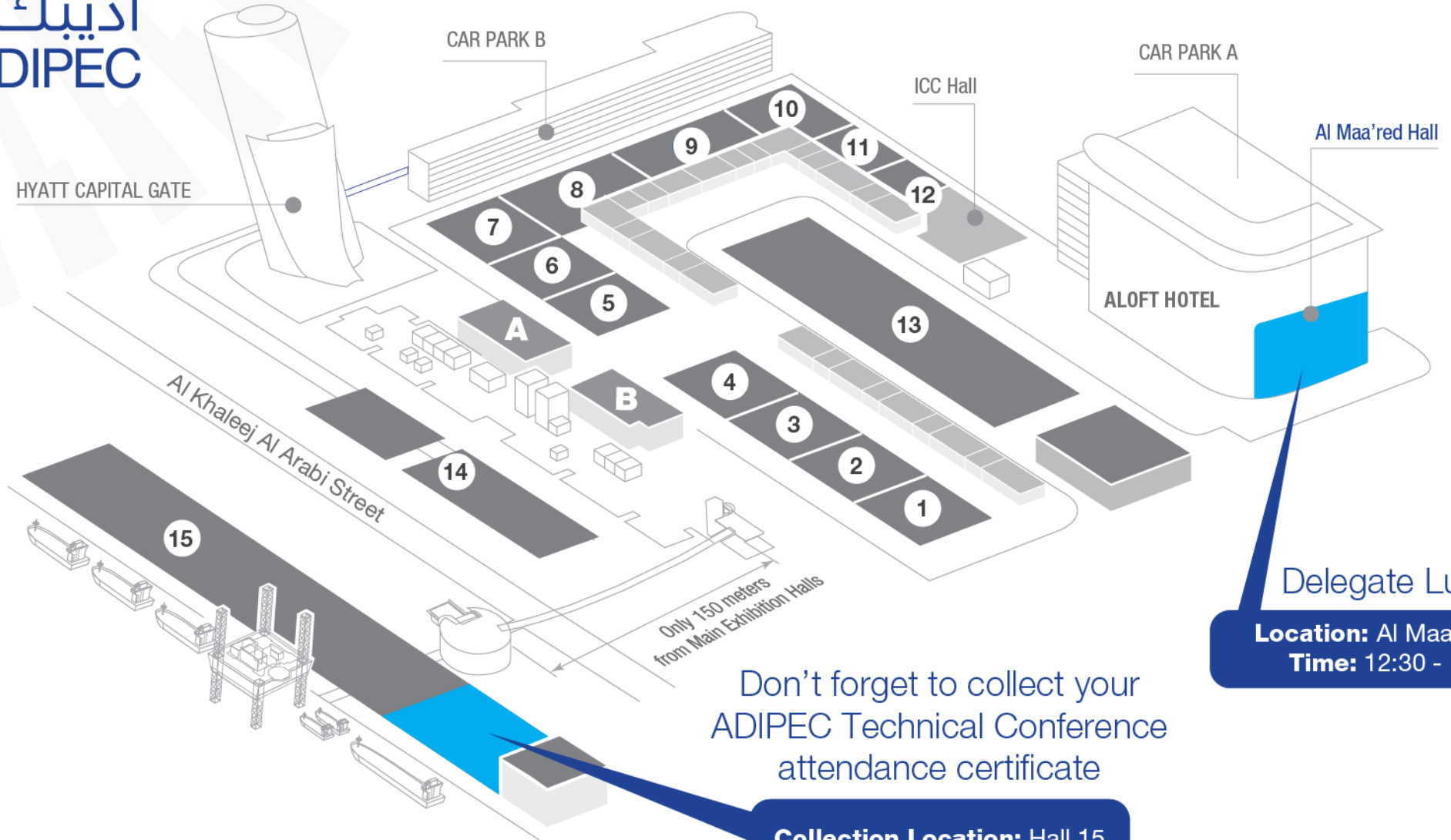
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