

# **DIGITALIZATION IN AL OPTIMIZATION:** status and challenges ahead

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# Agenda

- Introduction
- Where are we now:
  - SRP
  - LRP
  - ESP
  - IPM
- What we aspire: **Digital Oilfield**
- Conclusion

## CHALLENGE

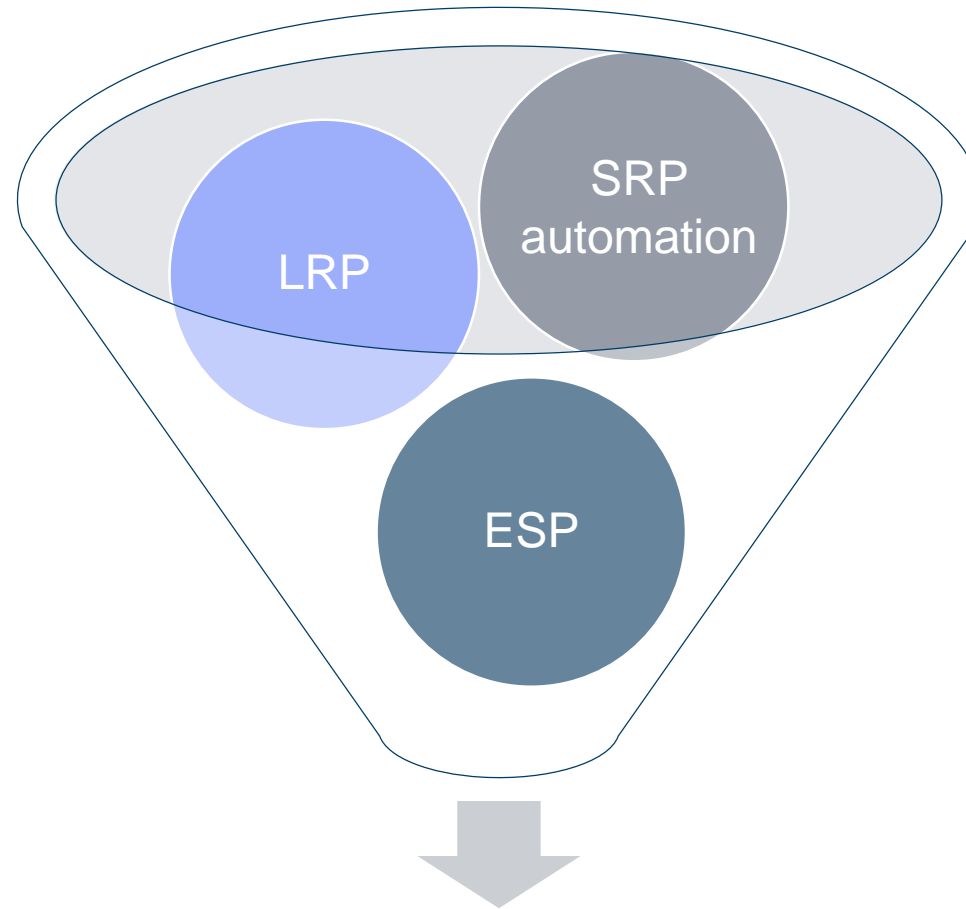


## SOLUTION

Improving efficiency  
( $Q_{HC}$ , \$)

Continuous monitoring of relevant well parameters in order to determine optimal production regime and decrease operation cost

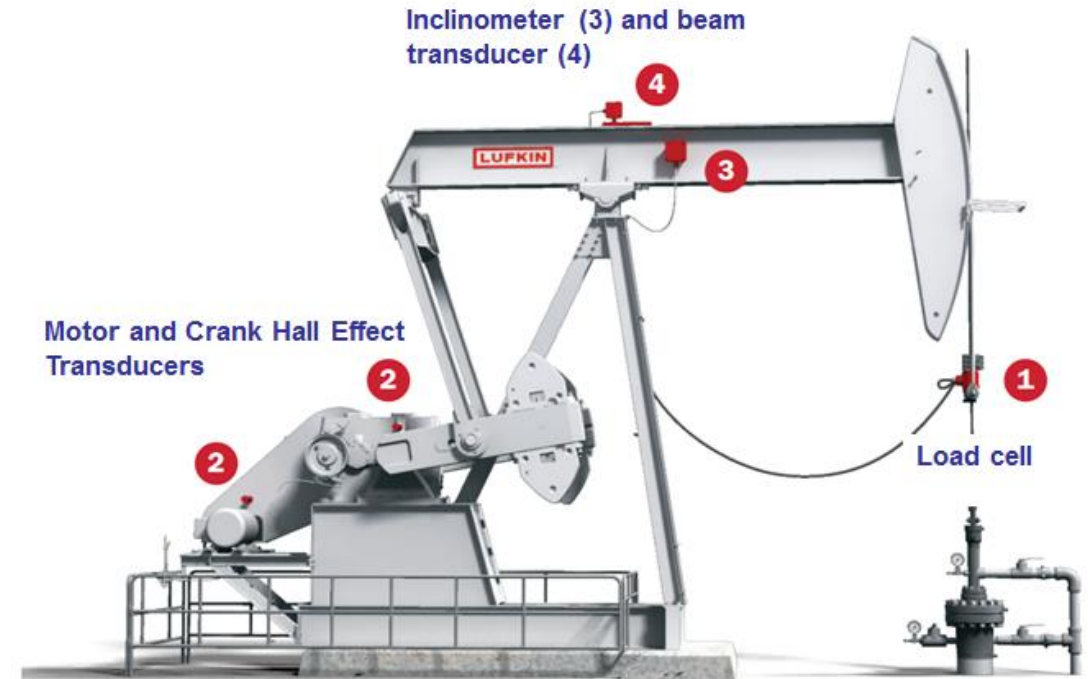
- Integrated Production Modelling
- SRP well automation - 2015
- LRP implementation - 2016
- Installation of ESP production equipment - 2018



INTEGRATED PRODUCTION  
MODELLING

# Sucker Rod Pump (SRP) well automation

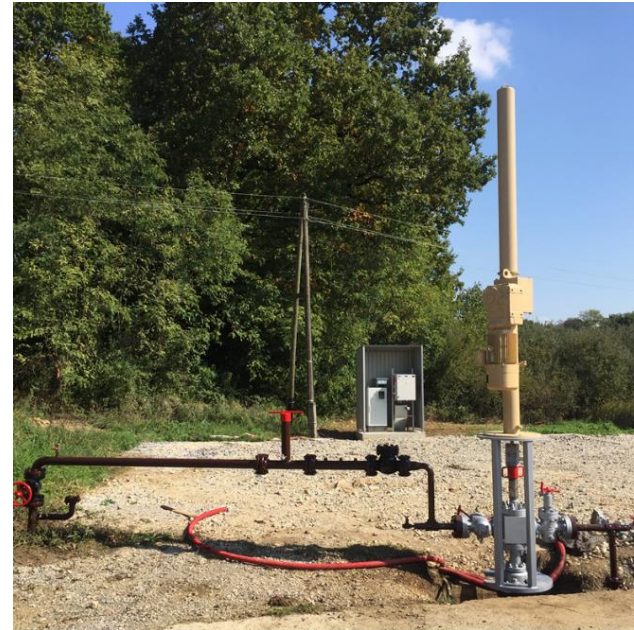
- Autonomous well control to maintain optimal production and increase well uptime
- Decrease in energy consumption and equipment maintenance cost
- Reduction of well measurement and well visit cost (real time monitoring)
- 47 wells, additional 20 planned
- 18.7% fluid production increase; 18.6% gas production increase
- 20% less workovers, 30% less cost of workovers





# Linear Rod Pump® (LRP)

- 13 wells, 10 additional in plan
- Automated stroke speed based on pump fillage (min 1 spm)
- Decreased cost of installation and maintenance
- SCADA
- Surface pressure and temperature transmitter



LRP unit

Monitoring well operation  
with SCADA



# Electrical Submersible Pump (ESP)

- ESP recompletion on 25 wells
- Downhole sensor: communication to surface via ESP cable
- Pump intake pressure and temperature, motor winding temperature, vibration, leakage, pump discharge pressure in real time
- Surface pressure and temperature transmitter
- SCADA

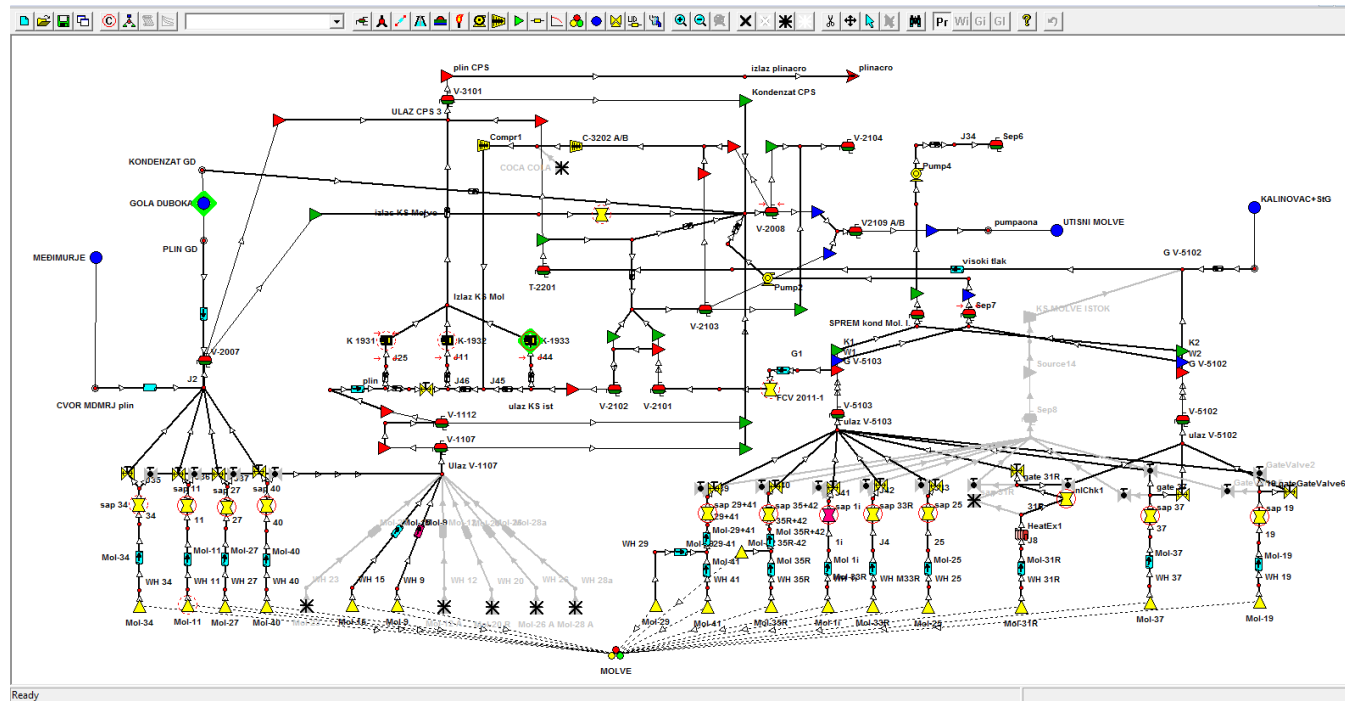


Flowline pressure and temperature transmitter

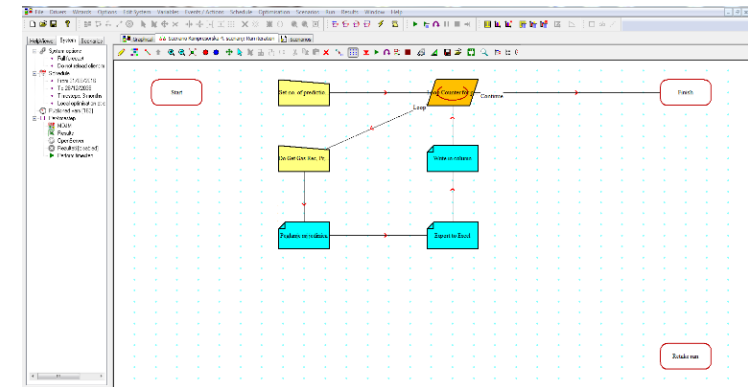
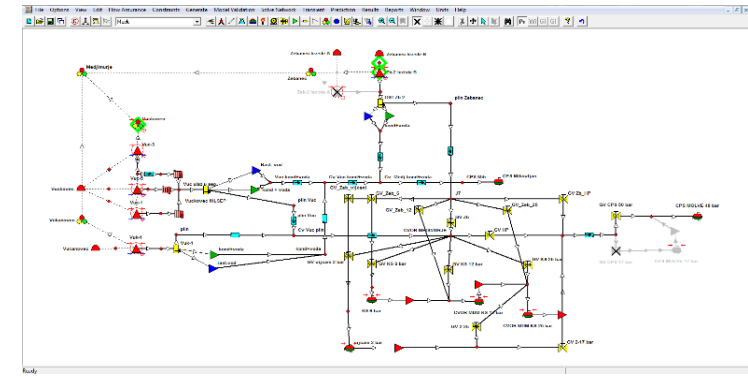
Downhole sensor



# Integrated Production Modelling (IPM)



- Production System Potential Determination – present/future
- Production Optimization – Bottleneck Shooting
- Production Allocation (Loss Management)

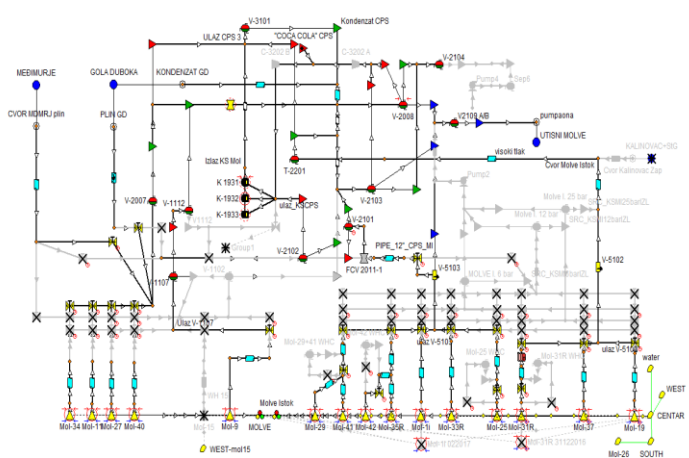
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# Digital Oilfield

## Integrated production modelling

- Development of on-line integrated production modelling
- Defining user variables for production optimization process and target range
- Engineering and operations support system



## SCADA System

- Providing real time data for IPM
- Digital and visual output
- Remote controlling of production processing
- Alarming and reporting

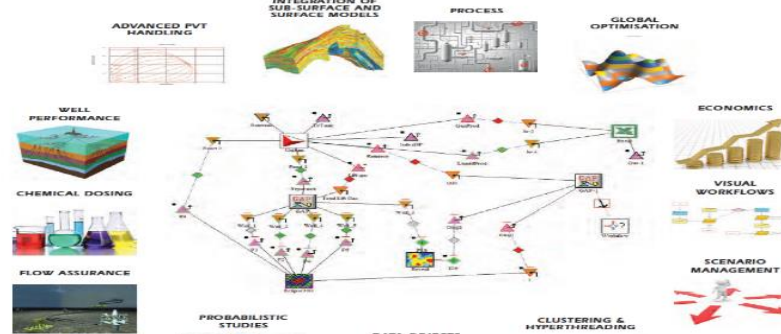


## Engineering evaluation and monitoring/Data mining

- Increased efficiency of engineering in field troubleshooting and finding new opportunities
- Allocated from field and able to monitor several fields
- Data historian
- Data handling

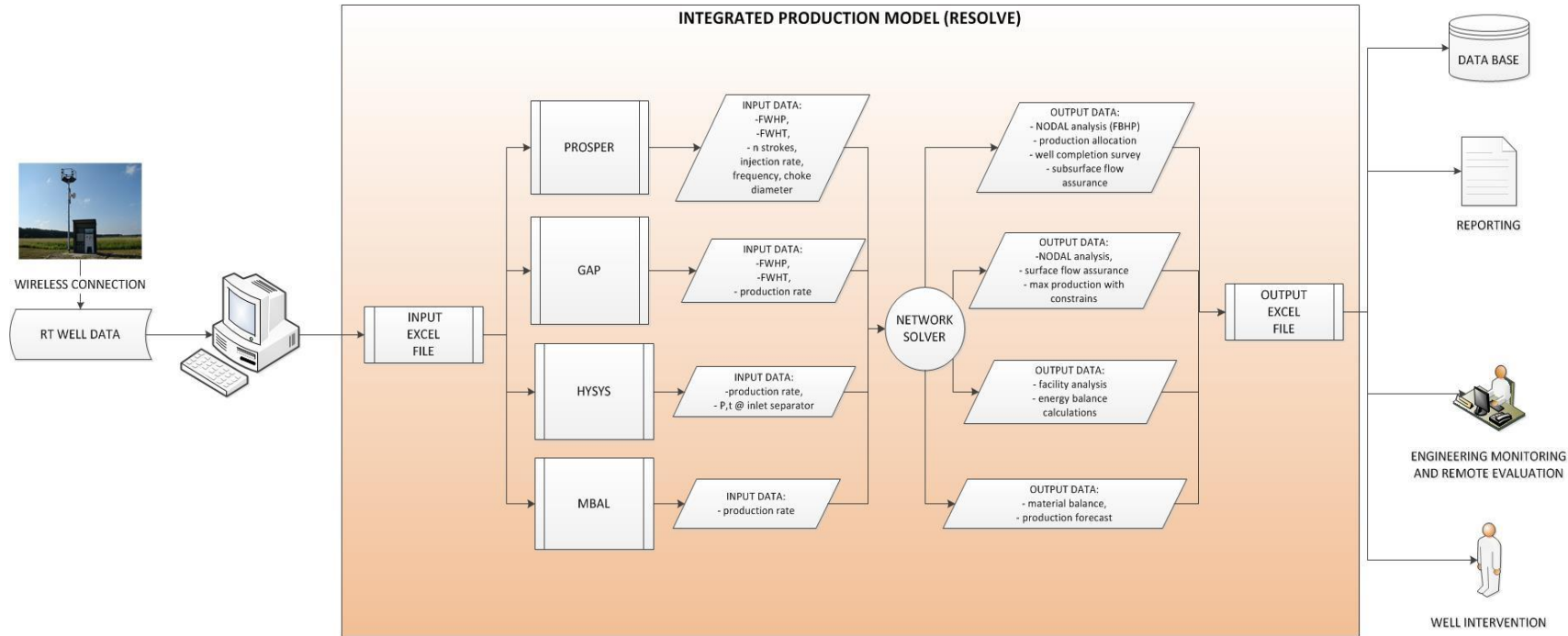


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# What is next?



## CURRENT STATUS:

- IPM models updating and upgrading
- RT on-line well data providing to operation service desk
- Debugging of modules calculations

## CHALLENGES AHEAD:

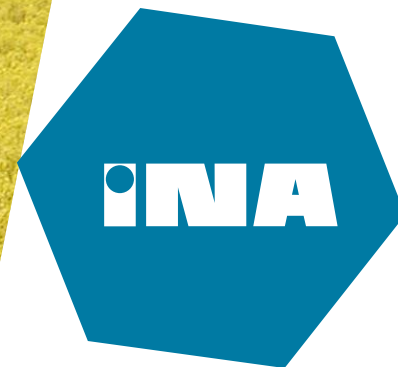
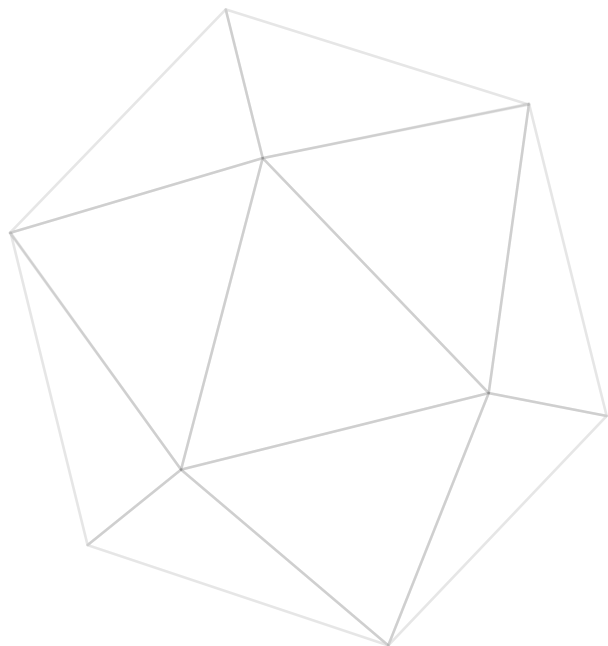
- Defining and implementation of Integrated Operation workflow and system
- Computing power requirements
- Improving engineering efficiency in evaluation and monitoring from dislocated center



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*Thank you!*







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# **DIGITALIZATION IN AL OPTIMIZATION:** **Backup slides**



Polished rod  
load cell



Beam transducers



Motor and crank  
position indicator



Flowline pressure  
transmitter

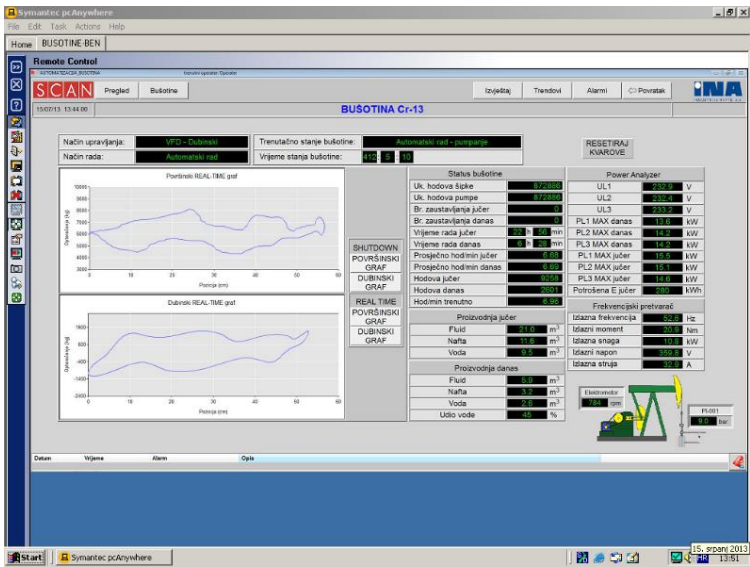


Rod Pump Control  
(RPC) unit



RPC and digital  
microwave radio link  
equipment

Monitoring well  
operation at  
SCADA system



- SCADA (*Supervisory control and data acquisition*) monitoring on gathering stations
- Flowline pressure transmitter
- Real-time downhole and surface dynamometer card
- Data on well production, downhole pressure, loads etc.

MAIN



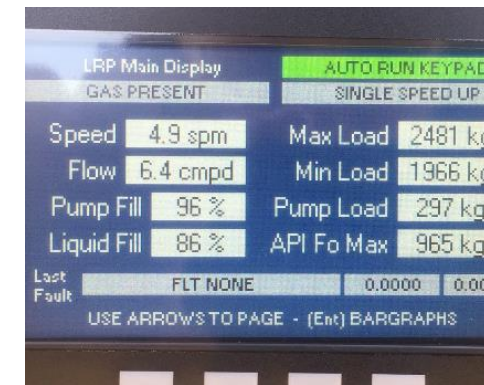


LRP unit and flowline pressure and temperature transmitter



Variable-speed drive (VSD) unit

MAIN



Real-time production data on surface control unit

