The First Cloud Enabled and Integrated Digital Oilfield for Kuwait Oil Company

Presenter:
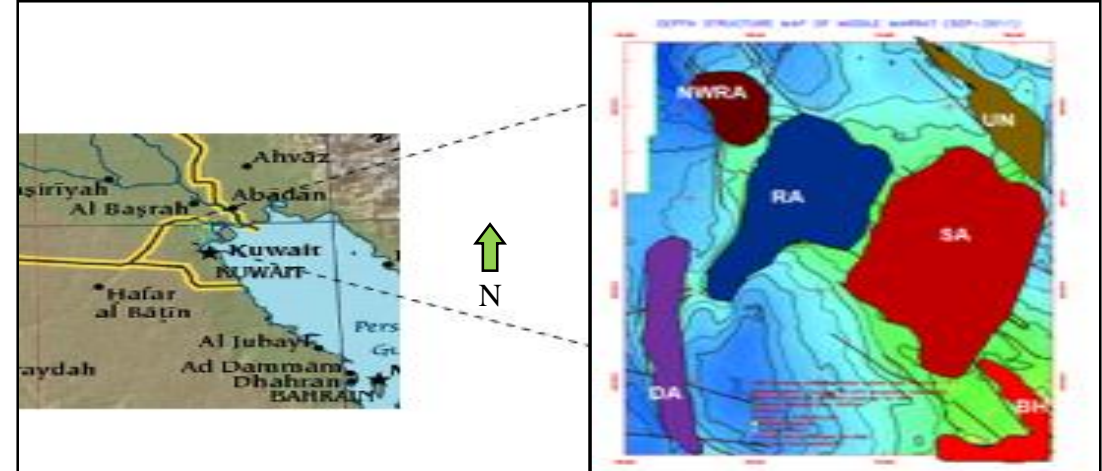
Shaikha Battal Al-Qahtani - Kuwait Oil Company

INTRODUCTION

Kuwait Integrated Digital Field (KwIDF) Jurassic Scope of Work

- ## Well site instrumentation for 100+ wells
  - WHP, WHT, DHP, DHT, FLP, FLT
  - Automated Chokes control & feedback
  - H2S & Gas Detectors
  - Chemical injection & Corrosion monitoring
  - CCTV cameras
- ## Data-driven workflows
  - Safety
  - Operations
  - Engineering
- ## Two Collaboration Rooms

Significant impact in HSSE:

Real time H2S and Gas leak monitoring

Substantial reduction of trips to wells

Immediate reaction closing wells remotely in case of emergency

KwIDF Evolution

2010

Phase I – Start Wells Instrumentation

2011

Collaboration Rooms

2012

Live System
- Sensors
- Automated Chokes
- H2S & Gas Detection
- Remote Wellhead control

2013

Initial value realized

2014-2016

KwIDF Workflow Enhancement
- Production Optimization
- Prevent Hydrates
- Fast Well Recovery
- Morning Gas Rush

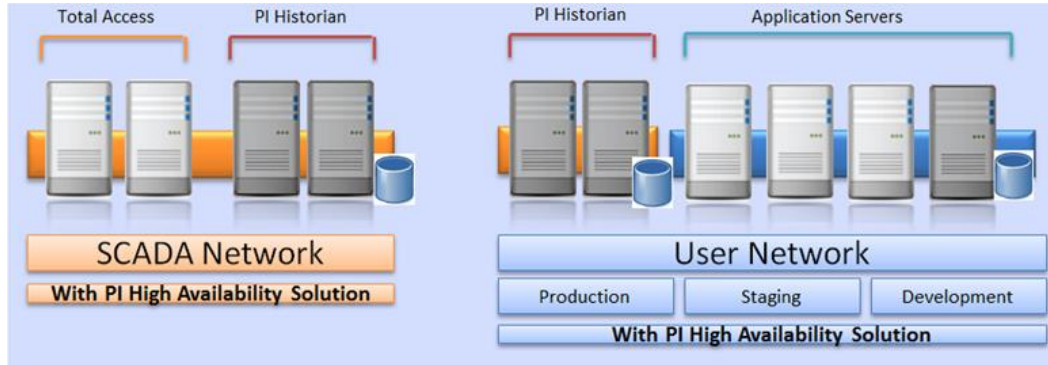*2.1 MM BOE of Production Gain (3 % YoY)*

2019+

KwIDF – JPF Full Digital Integration
- 120+ wells
- Safely achieve 510 MMscfd target
- Minimize unplanned production deferment
- Maximize Reservoir Recovery

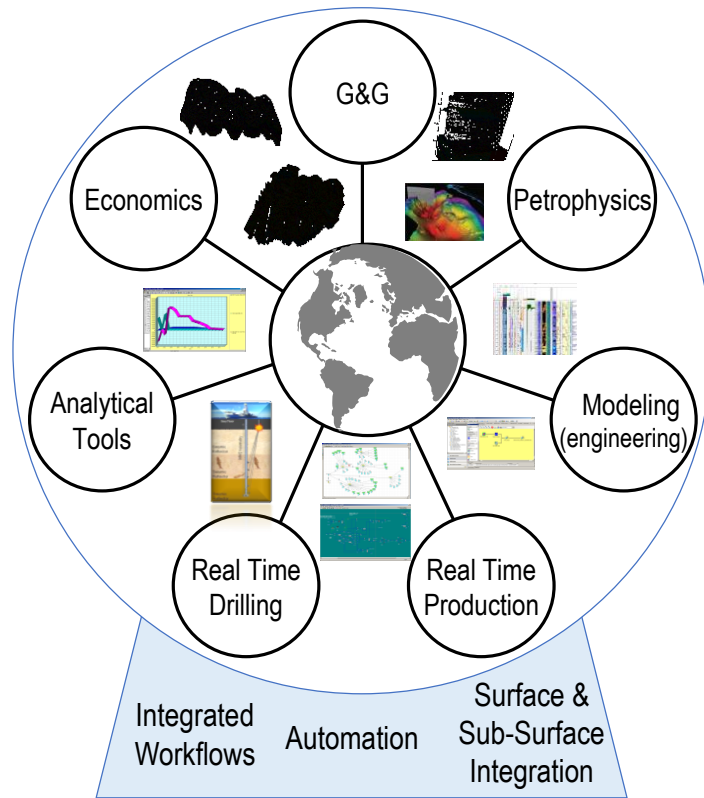TRANSFORM NK JURASSIC GAS KwIDF INTO THE 1st INTEGRATED SMART FIELD

Pore to Process

4

OBJECTIVE

What is the overall purpose of KwIDF

1. **Sustainable achievement of production targets**
2. **Dependable Safety (HSSE)**
3. **Application of Best Practices (Reservoir, Wells & Facilities)**

Efficient Reservoir Management

Collaboration

1. **HSE Monitoring**
2. **Early detection of well conditions**
3. **Increased operational efficiency**
4. **Faster decisions**
5. **Integration of Surface Subsurface & optimal Management of asset**

Field Instrumentation

Choke Valve controls

Flowline Pressure

RTU and power supply distribution

THP/CHP monitoring

GD and H2S Monitoring

SSV Controls (Hyd. Panel),

Objective

KwIDF Jurassic Digital Oil Field project started as pilot project. Over the 10 years of operation, data volumes are increasing rapidly with multiple workflows driven by multiple applications and the infrastructure built was as a pilot with limited features.
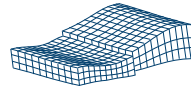
It was essential to build a robust infrastructure for the current and future requirements which will become more complex with the onset of advanced engineering workflows and exponential increase in the volume of data.

- Optimize daily production workflow
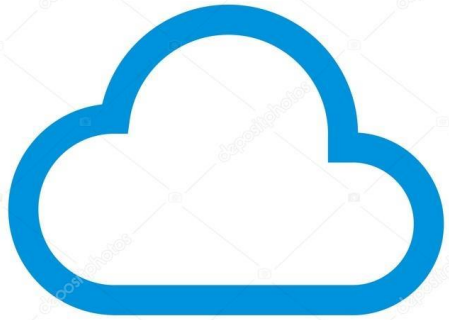- Field remote operations workflow
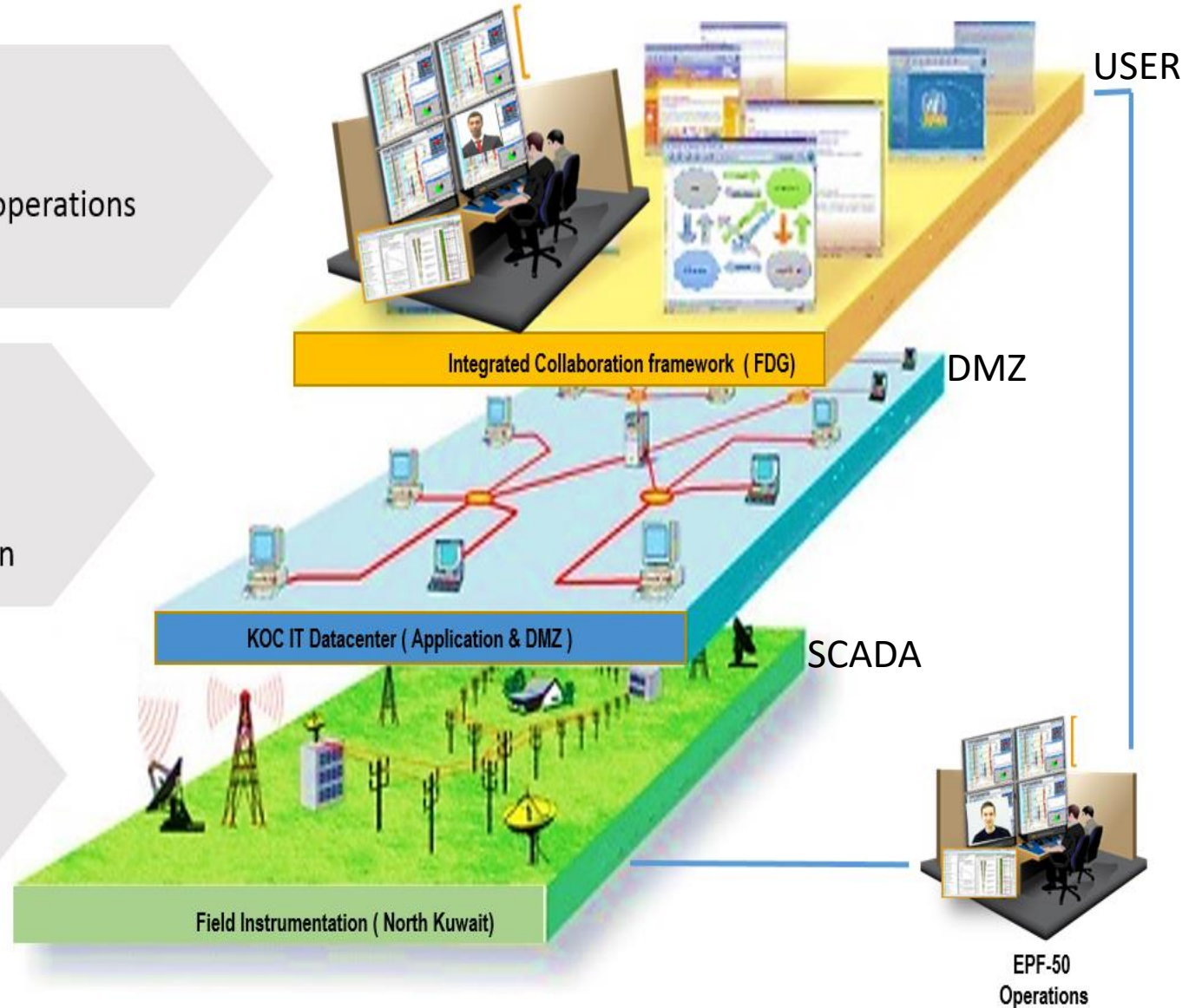- Well Review
- Well Performance
- Analytics

ARCHITECTURE FRAMEWORK

Dataflow

Engineering Workflows
Decision & Strategy room
Video Conferencing Capabilities with operations
Analysis of real-time data trends

Production data platform
DMZ real-time data replication
Back-Allocation process,
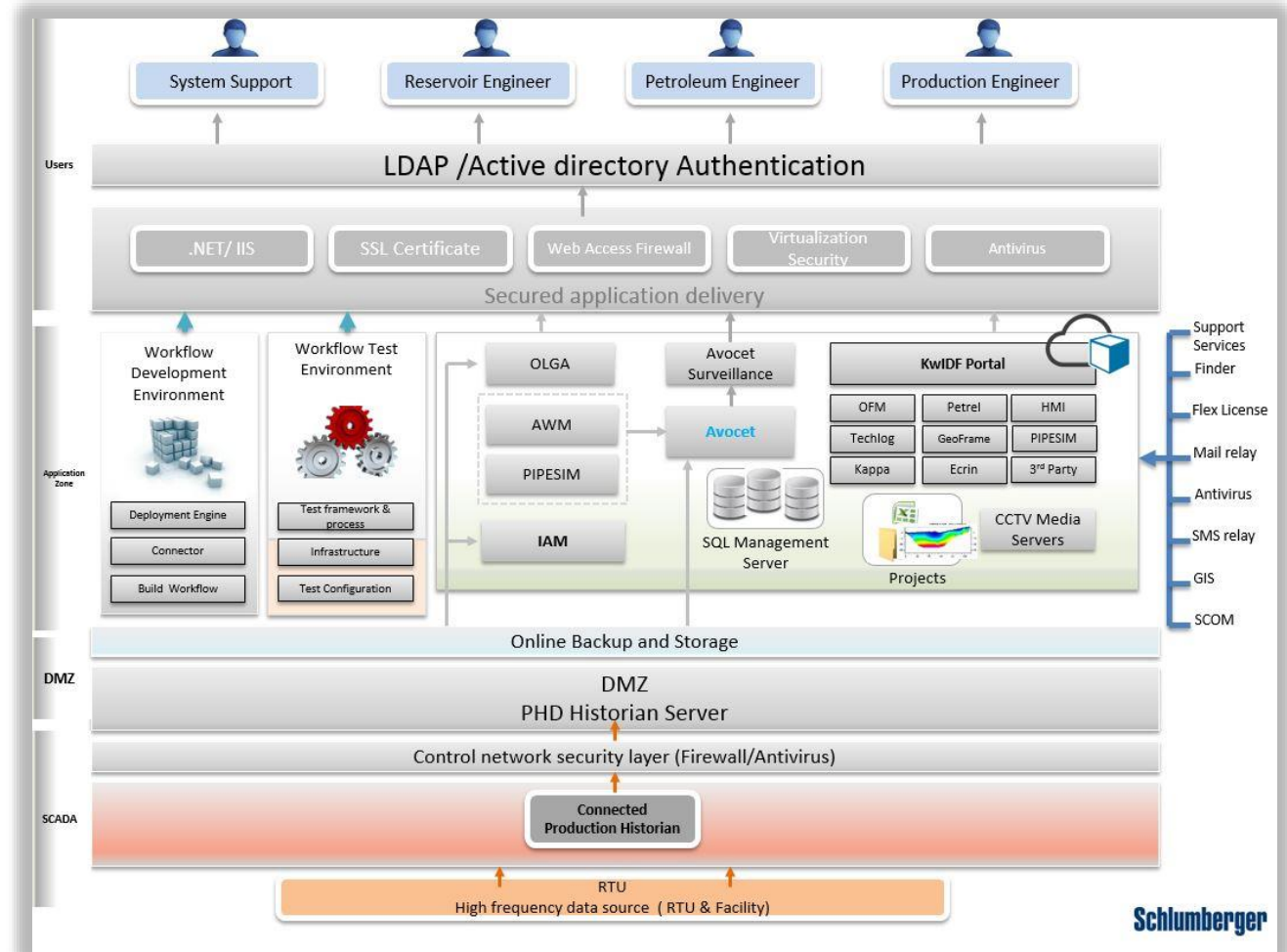Integration with Subsurface application

Real-time Data capture
Well operations
Remote well operation

USER

DMZ

SCADA

Integrated Collaboration framework (FDG)

KOC IT Datacenter (Application & DMZ)

Field Instrumentation (North Kuwait)

EPF-50
Operations

Infrastructure Framework

A Fully integrated Private Cloud architecture design has been designed using Schlumberger next generation application delivery platform Solution (IaaS) Infrastructure as a Service.

The Private Cloud and Virtualization solution primarily on Virtual Desktop Infrastructure (VDI). This will extend the user access to entire KOC network and high performance access to improve decision-making for operational and Field development teams.
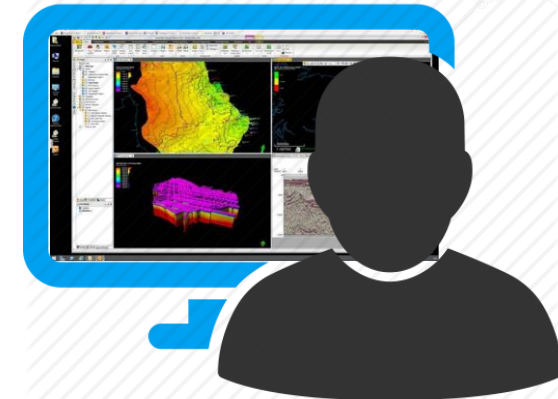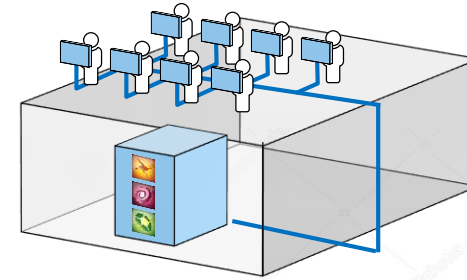
Step change cloud architecture

This will be the first fully integrated Digital Oil Field Project in KOC. Integrated with SCADA, KwIDF Applications and Subsurface applications.

Adding Private cloud platform for KwIDF will take the project to a new level of business improvement and enhance operational performance.

IaaS Infrastructure as a Service VDI Solution

Key Challenges

Key Challenges

Data security is one of the critical concerns for KOC, We ensured the project is compliance to KOC IT security policy.

Isolated network and integration with multiple domain controllers,

Extending accessibilities of KwIDF applications outside Collaboration room.

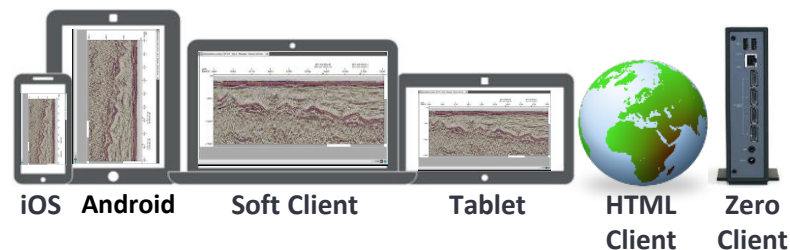Governance and administration Control of infrastructure.

Technology adoption and change management.

Business Value

Business Value

- Secured E&P private cloud solution approved and validated by KOC IT Cloud Committee

- The Infrastructure solution scales easily to 250+ wells,

- Infrastructure is ready to integrate facility data to KwIDF

- Virtualization Solution, providing High Availability and Disaster recovery solution. Ensuring business continuity.

- Centralized data store and provides multiple levels of data protection.

- High performance computing using 10G network and Flash Storage.

- Access to KwIDF applications across KOC network.

- Provide platform to publish 3rd party applications.

iOS   Android   Soft Client   Tablet   HTML Client   Zero Client

Access from Anywhere

Improve

operating efficiency

cost per barrel

Production performance

SPE Publications

SPE - 163365

Creating a Secure IT Infrastructure for the Kuwait Intelligent Digital Field

SPE Kuwait International Petroleum Conference (KOGS 2012), Kuwait,
10-12 December 2012

SPE - 175398

Kuwait Digital Integrated Field - Enabling virtualization technology for a step change

SPE Kuwait Oil & Gas Show and Conference (KOGS 2015), Kuwait
12- 15 October 2015

SPE - 187605

How Private Cloud Solution go beyond the Conventional Infrastructure Solution for Jurassic Kuwait Digital Integrated Field

3rd SPE Kuwait Oil & Gas Show and Conference (KOGS 2017) , Kuwait
15- 18 October 2017

SPE-198089

Secure & Resilient Digital Oil Fields in Kuwait Oil Company.

SPE Kuwait Oil & Gas Show and Conference (KOGS 2019) , Kuwait
13- 16 October 2019

Thank you