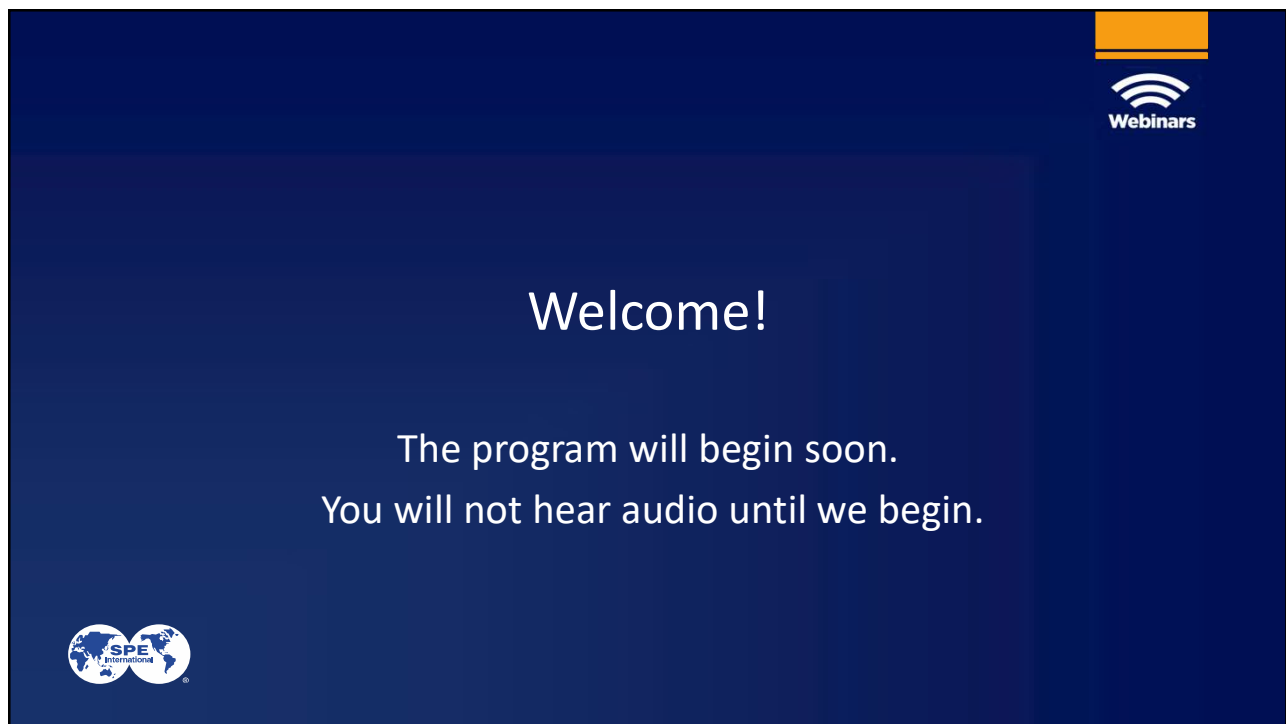




A dark blue rectangular slide with a white border. In the top right corner, there is an orange square above a white Wi-Fi symbol and the word "Webinars". In the center, the word "Welcome!" is written in large white font. Below it, two lines of white text read: "The program will begin soon." and "You will not hear audio until we begin." In the bottom left corner, there is a white logo for "SPE International" featuring two globes.

Webinars

Welcome!

The program will begin soon.
You will not hear audio until we begin.

SPE International



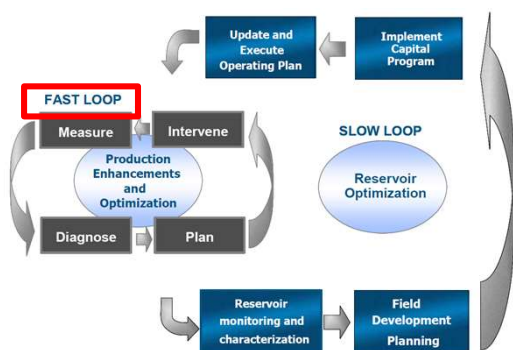
Smart Completion – Case Study

Presenters: Leila Bannister, Indira Saripally
Authors: Leila Bannister, Indira Saripally, Ben Carter, Jeff Manning
01/26/2023





Why Intelligent Completions (RECAP)



Objectives

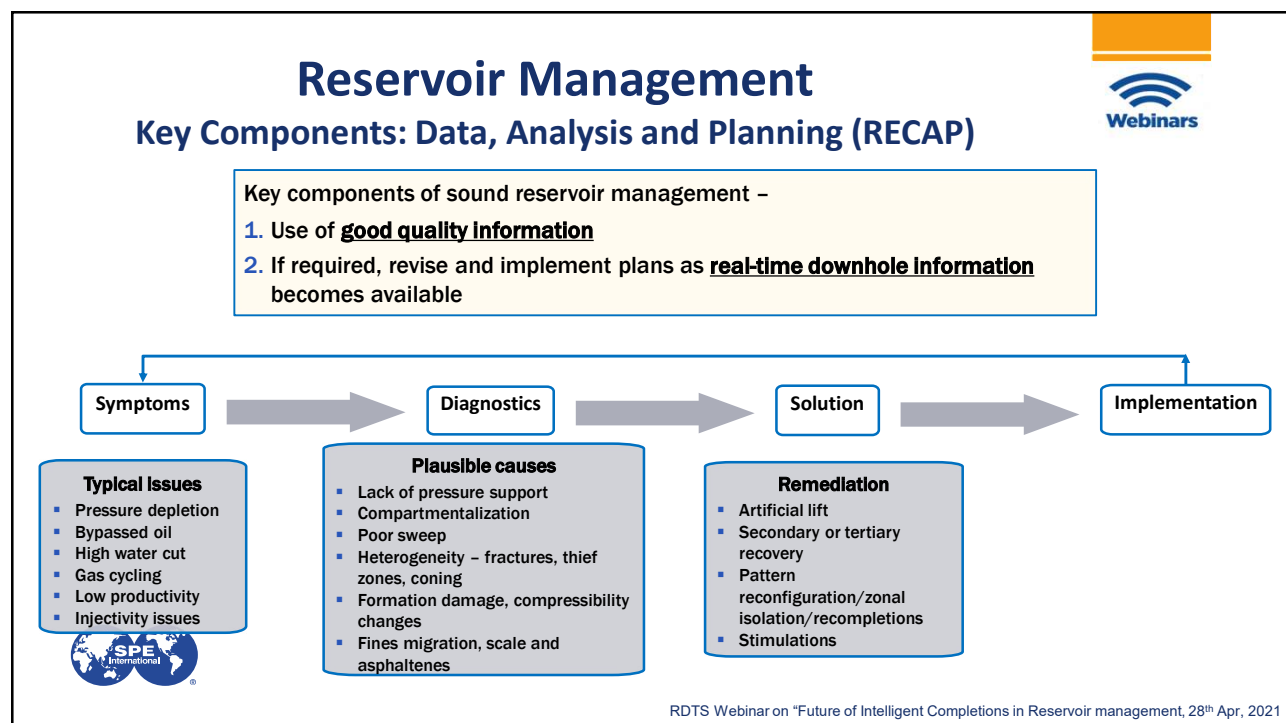
- Increasing Production
- Reducing Capital & Operating Expenditures
- Improving Total Recovery
- Improving Safety & Environmental Performance

Application Areas

- Conditional Monitoring
- Well Performance
- Well Stimulation
- Flow Assurance
- Advanced Completions
- Reservoir Characterization

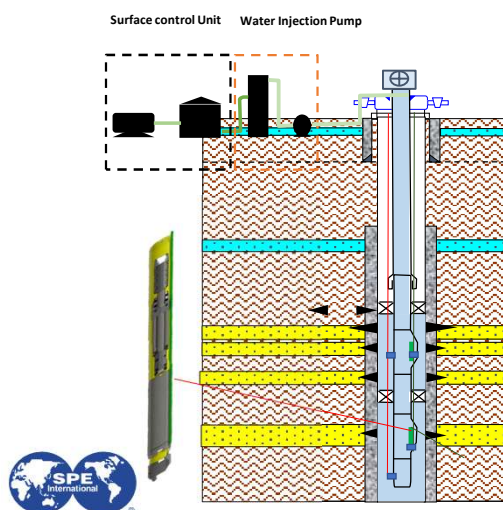


RDTs Webinar on "Future of Intelligent Completions in Reservoir management, 28th Apr, 2021



Role of Intelligent Completions in CO₂ Floods

Case Study (RECAP)



Completion Design:

- Role of all-electric intelligent completion with
 - Electric valves
 - Distributed fiber optic acoustic sensors

Well Monitoring:

- Permanent Fiber Optics with DAS* and DTS**
- Remote Valve actuation

Candidate selection process:

- Key ranking parameters
- Scoring methodology

*DAS: Distributed Acoustic Sensing

**DTS: Distributed Temperature Sensing

RDTS Webinar on "Future of Intelligent Completions - EOR, 9th May, 2022

Evolution of digital Technology

Role of Smart Completions

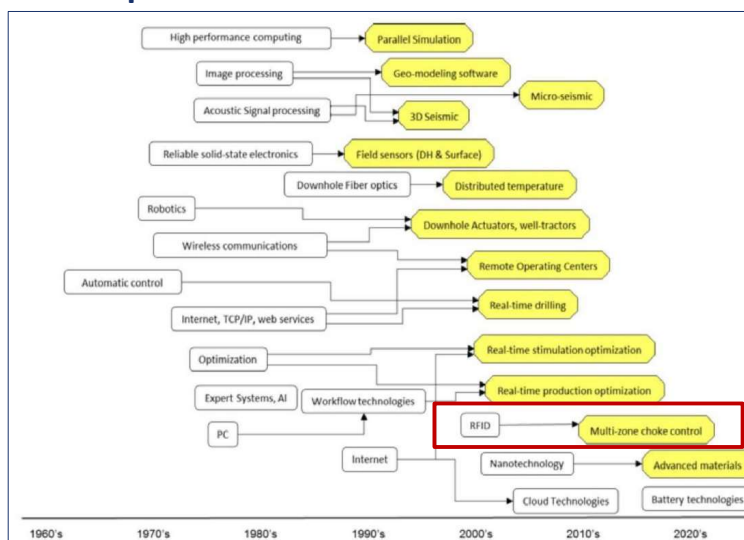


Digital revolution in oilfields started since 1960s

Exponential growth seen in recent years

Recent advancements include (but not limited to) -

- Digital data acquisition
 - Data validation, storage & protection
- Optimization of processes
 - Reservoir surveillance
 - Production optimization



SPE-195095-MS

Smart Completions - Typical Components



Examples of equipment used in smart completions

- Downhole instruments used for monitoring:
 - Gauges (pressure , temperature)
 - Chemical mandrels
 - Multi-phase flow meters (MPFMs)
- Remotely controlled downhole instruments:
 - Downhole choke
 - Surface Controlled Subsea Safety Valve (SCSSV)
 - *Sliding Sleeves*



Smart Completions – Sliding Sleeves



Sliding Sleeve Characteristics

- Control valves are hydraulically actuated from surface to control upper and lower sleeves
- Multiple zones can be commingled behind single smart sleeve
- Provide operational flexibility to adapt to challenges during life of well
- Valuable for avoiding subsea well intervention where costs are high (\$10MM+)
- Smart sleeves available in on/off OR downhole choke variations
- A real-life example of one well navigating multiple operational upsets throughout time using sliding sleeves to stay online, will be reviewed in future slides



Conventional vs Smart Completion



	Conventional	Smart Completion	Comments
Direct Monitoring		x	Smart Completion: Continuous, real time data
Remote Control		x	
Water Management		x	Open or close zones selectively
Sand Management		x	Open or close zones selectively
LPLT	x	x	
HPHT	x		
OPEX	High	Low	Smart Completion: No manual well intervention needed to operate
HSE Risk	High	Low	Smart Completion: Due to elimination of wellwork, lower HSE risk
Capital Cost	Low	High	Conventional: Lower capital cost
Failure Rate	Low	High	Smart Completion: Cables, Wires, Gauges, Transmitters, etc.
			Pros
			Cons



Case Study



Well #1: Deep water Gulf of Mexico

Successful use of sliding sleeves in a deep water GOM producer well navigating multiple operational upsets

- Well testing
- Water management
- Sand control



Case Study Field Background

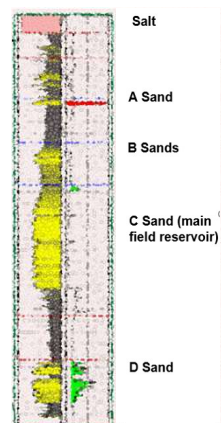
Field Overview:

- Field in the northern Gulf of Mexico (GOM) producing 5+ years
- Subsalt reservoir with best in-class Pliocene sands (main reservoir)
 - Good porosities
 - Permeability up to 1 Darcy
- Comprising multiple, stacked, turbidite sands
 - Wells commingled from multiple zones
- Strong aquifer drive

} **Stacked reservoirs,
subsea wells**

Field Development History

- Developed with subsea wells only
- Deep water field
- Well initial production over 10,000 bopd per well
- Rapidly increasing water breakthrough seen in most wells
- Wells are on riser-base gas lift



Well #1 Background Surveillance and Symptoms



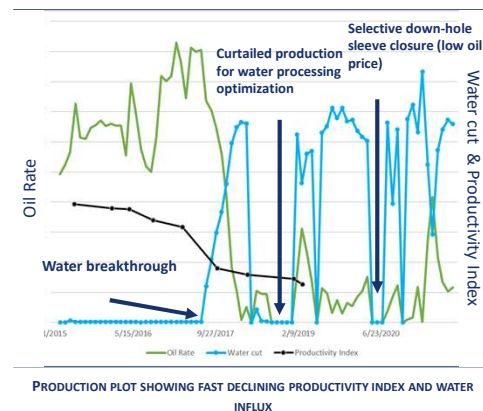
- Legacy well in the field (Well #1)
- Produces from 3 zones
 - Lower zones commingled, C2 & C3
 - Upper zone, C1: Highly laminated, lower perm
- Well initially produced from lower zones only
- Water breakthrough occurred from lower zones, increasing quickly within few months

Identifying symptoms:

- Rapidly declining oil productivity index
- Very high water cut



Well with high water cut & low productivity



Identifying Source of Water



Symptom

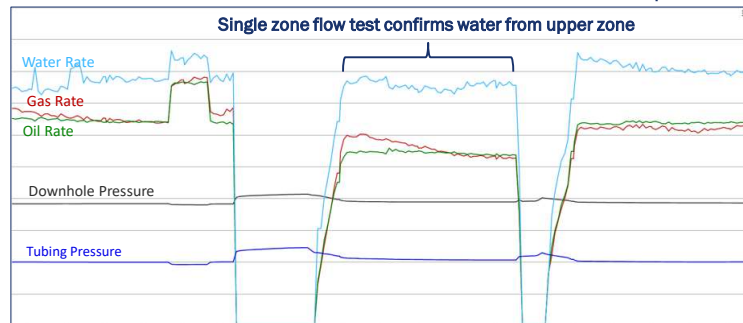
- MPFM shows water production

Diagnostics

- Pressures and flowline sample confirm water production
- Single zone flow test to confirm origin zone

Solution

- Used remotely operated sliding sleeves to test each zone separately
- Identified zone contributing water
- Findings improved history match and production forecast



Managing Water Production



Symptom

- Manage water cut (WC) to maximize near term oil production

Diagnostics

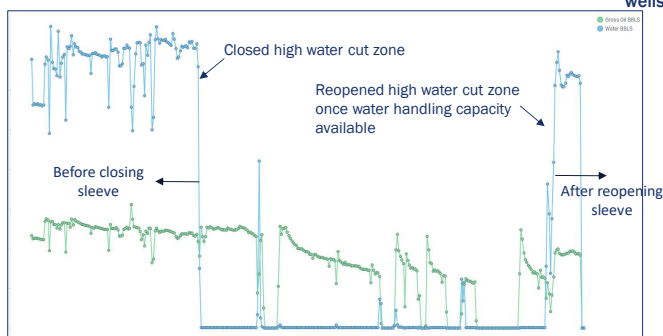
- Identified high WC well with lower zone that did not produce water

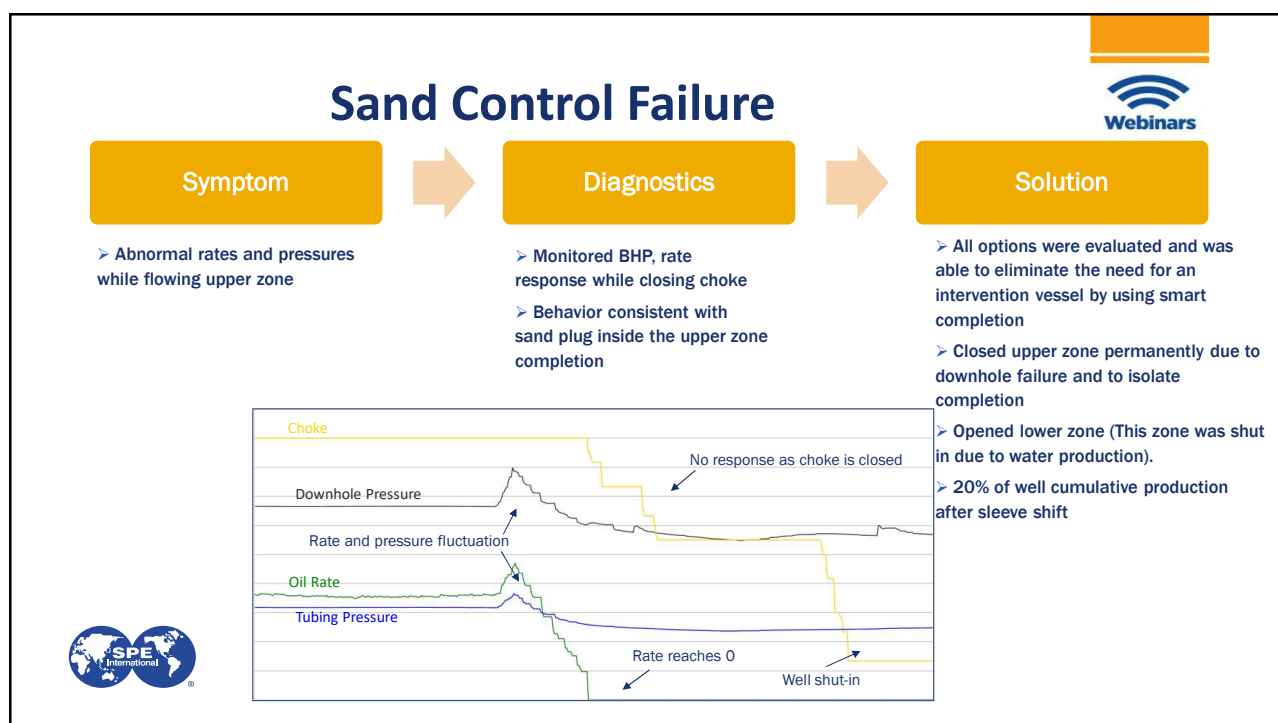
Solution

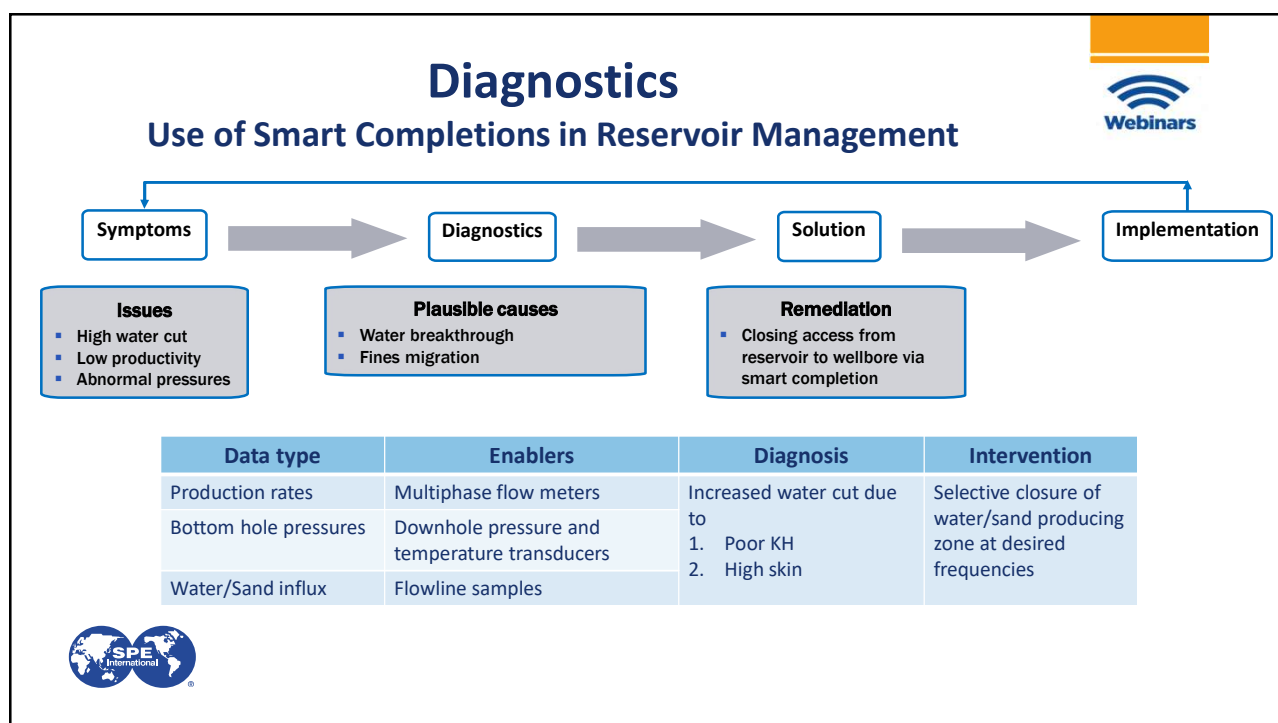
- Using remotely operated sliding sleeves, shifted water producing zone closed and opened zero percent WC zone
- Allowed targeted production of other wells with no net production loss

Water Rate

Oil Rate







Conclusion

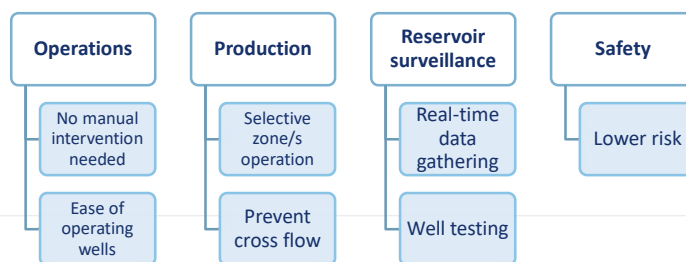
Why Smart Completions...



How did having smart completion benefit the well?

- Allowed operator to manage different zones within the wellbore in real time without needing well intervention
- Maximize production despite subsurface challenges
- Provided operational flexibility that enhanced value through optimization and improved recoverable volumes

Benefits seen from smart completions applications in the field



Lower OPEX - \$\$



Discussion + Q & A Session

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