



長安大學
CHANG'AN UNIVERSITY



DOFIAC 2017
第五届数字油田国际学术会议
The Fifth Digital Oilfield International Academic Conference

DOF challenges: Control and engineering systems integration

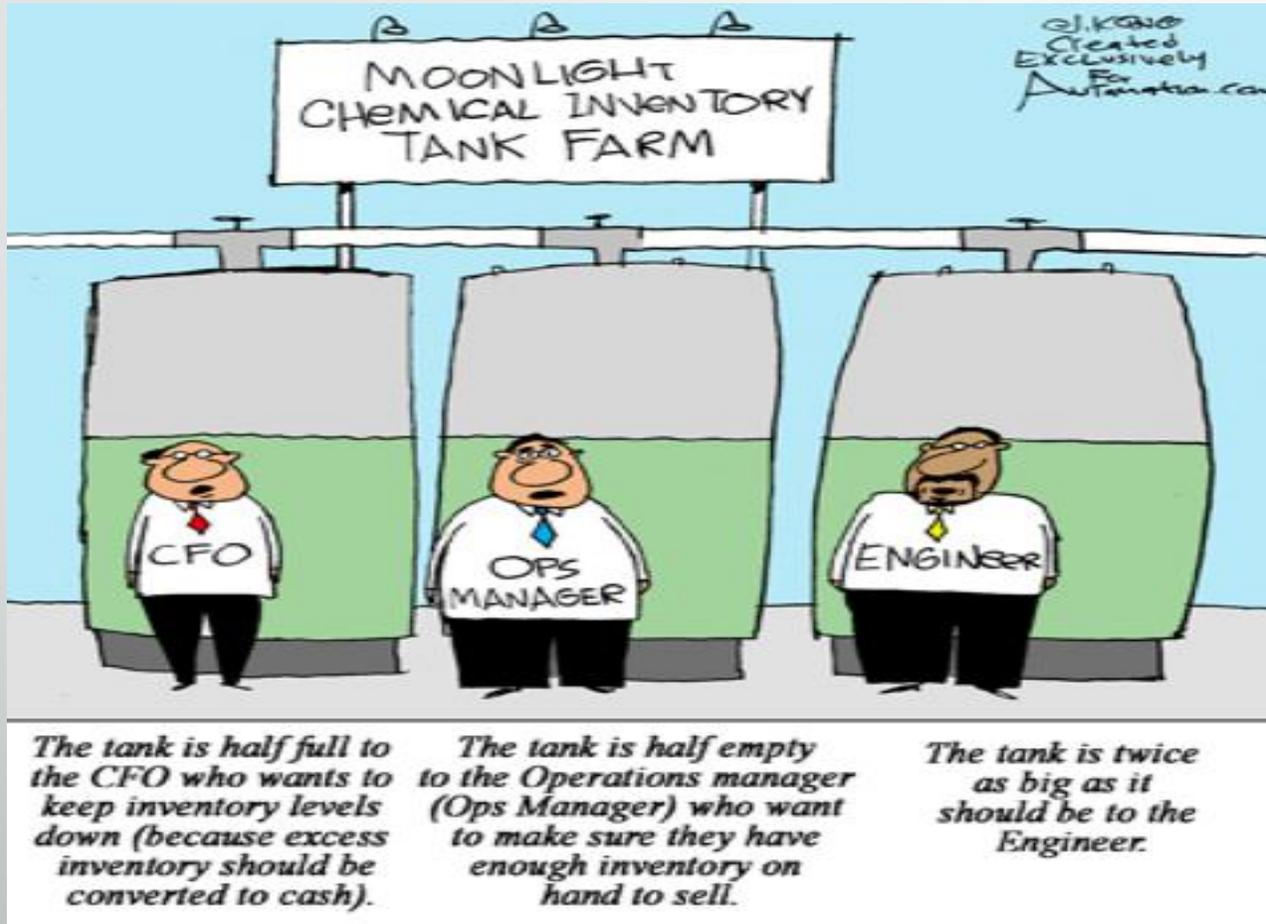
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高級數字油田顧問

Qingdao, Republic of China

2017

Challenge: How we are thinking?



Alarming Statistics:

- 60 % of time is spent in search for information,
- 10 % that information is correct
- Do you know that decision is implemented ?

3人不能相互理解

DOF challenges and drivers

- **It was** relatively easy and cheap to get production from the ground with high oil prices
- Field measurements and control technology maturity
- Deficiency in IT networks infrastructure, especially on scattered fields
- No modern inexpensive communication media (FO & LTE)
- No standard Specialized Informational software solutions covering DOF
- High performance IT hardware solutions (servers, network)
- Gap between NOC and vendors
- Organizational silos in Oil companies
- Manual business processes between field development, production and operation areas
- Isolated islands between Automation and Petroleum engineering areas
- Human organization not ready for new kind of work

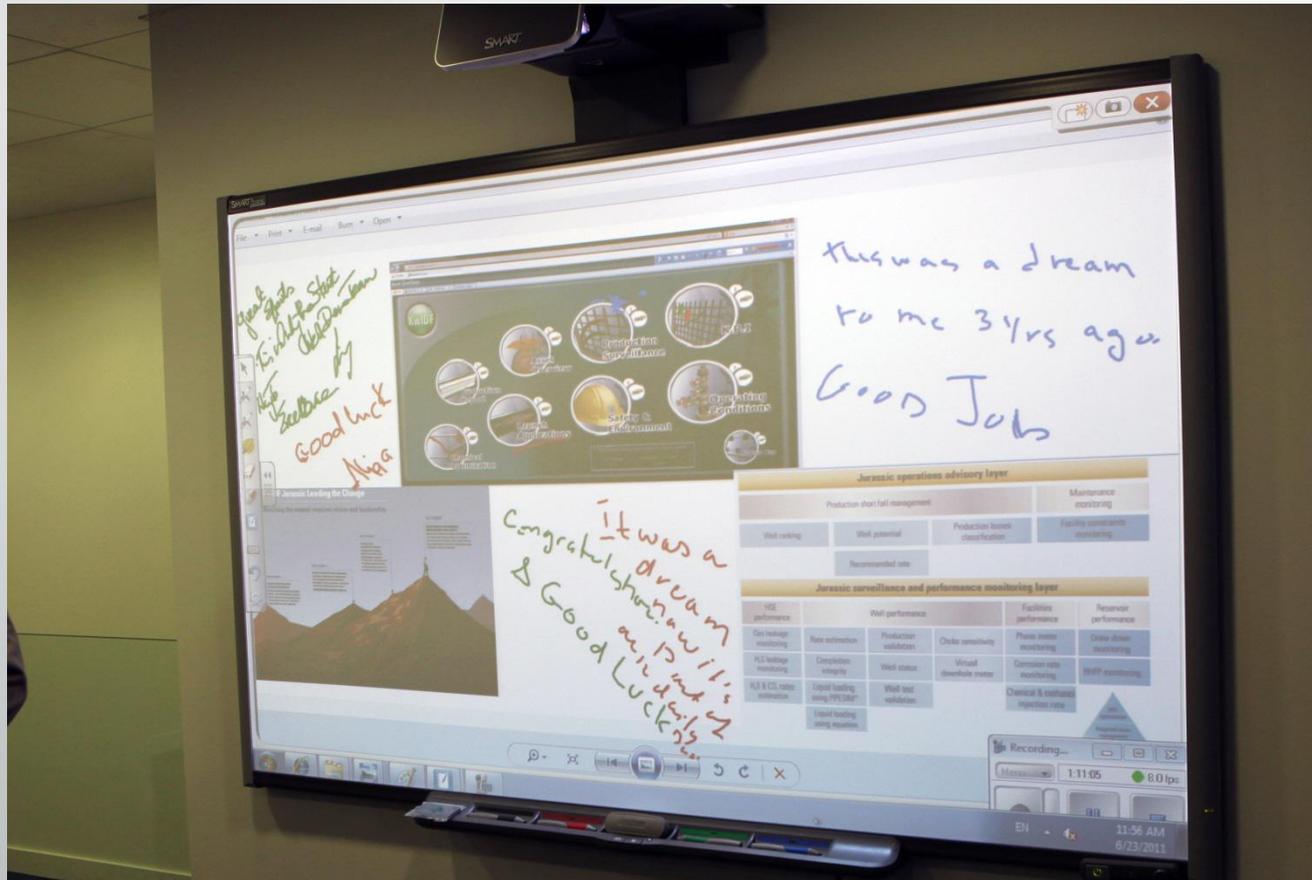
What is DOF?

- DOF is far beyond of advanced wells instrumentation
- Is DOF is end point?
- Can DOF solution to be standardized?
- What is next steps to resolve Oil company issues?
- What do you need – field devices, software, collaboration?

SCADA is base for DOF

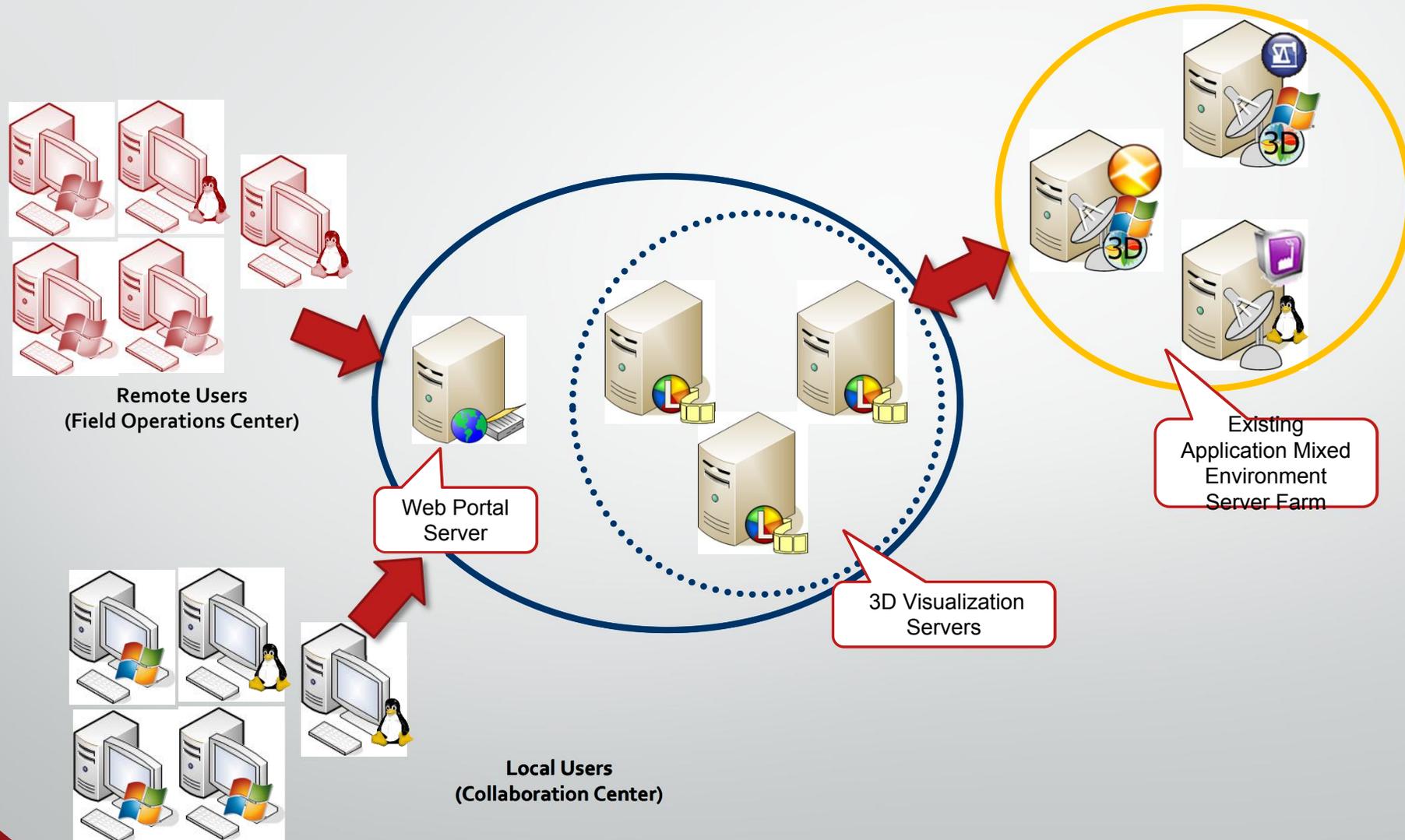
- Without advanced SCADA DOF is not possible!
- SCADA is crucial component in controlling and monitoring fields remotely, helping to run operations more efficiently and safely.
- However if this information remains in the field, major part of benefits remain unutilized
- A key issue how safely and reliably transfer real-time information to engineers
- Capable to receive and execute demand from Collaboration centers in semi- or automated manner
- Future control from remote location, if local is not available or inconvenient
- Polling method of data collection and SCADA communication protocols are no more matching available network capabilities
- SCADA RTU and software need to be improved to match current level of IT technologies.

DOF collaboration technologies

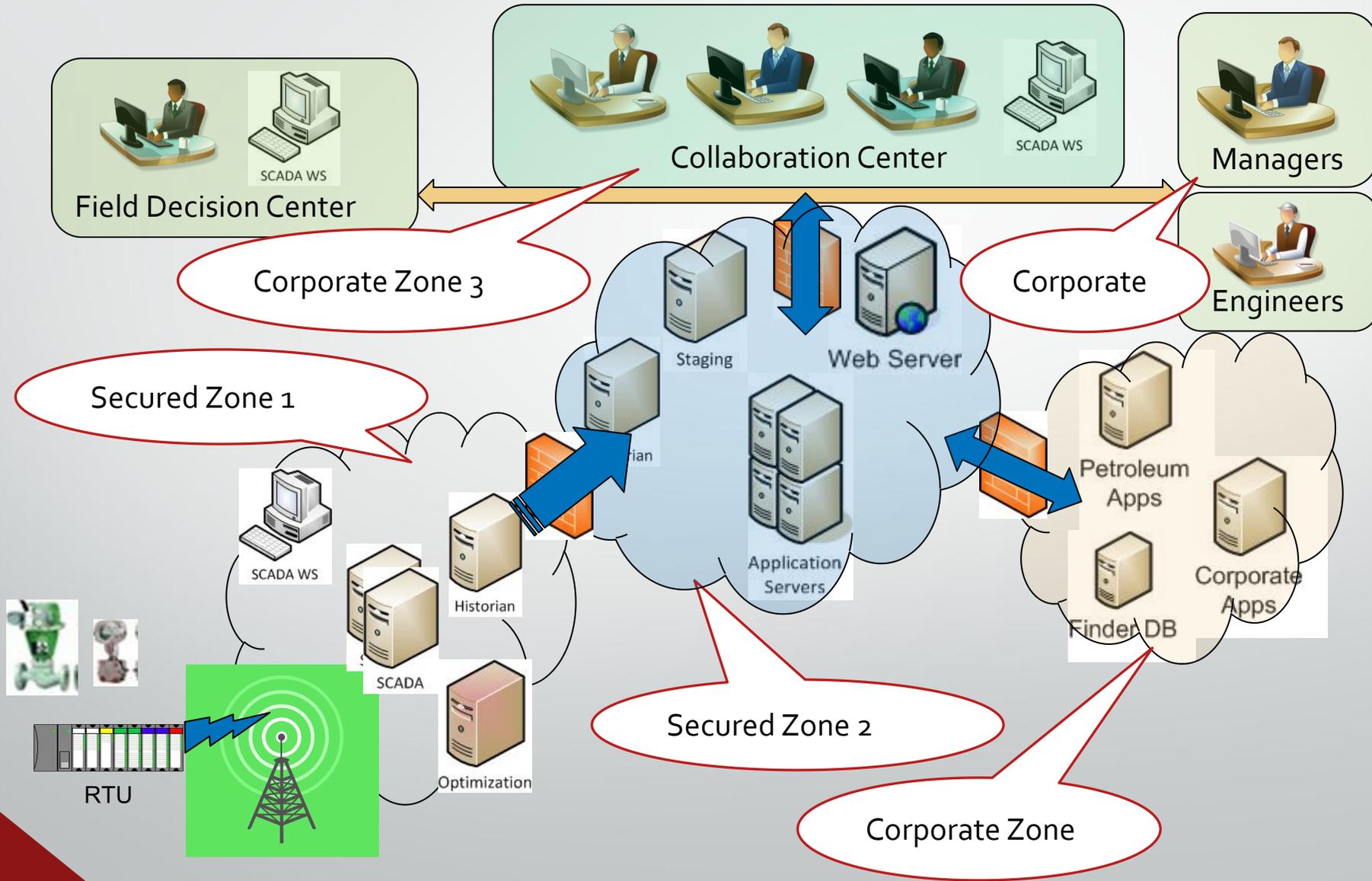


- Sharing of engineers desktops
- Handout notes
- Along with main screen projection
- Engineers has same view in remote areas

Collaborative portal with Web Accelerator



DOF Typical architecture



DOF vs. Information systems portal

| | DOF | IS portal | |
|---|-----|-----------|--|
| Intelligent aggregating algorithms. | Y | N | |
| Adoptable multidiscipline collaborative environment | Y | N | |
| Validated real-time and historical data | Y | Y | |
| Decision support system | Y | N | |
| Human interactions automation via workflows | Y | N | |
| Coordinated optimization and control capabilities | Y | N | |
| Modern IT components (virtualization, HPC) | Y | Y | |

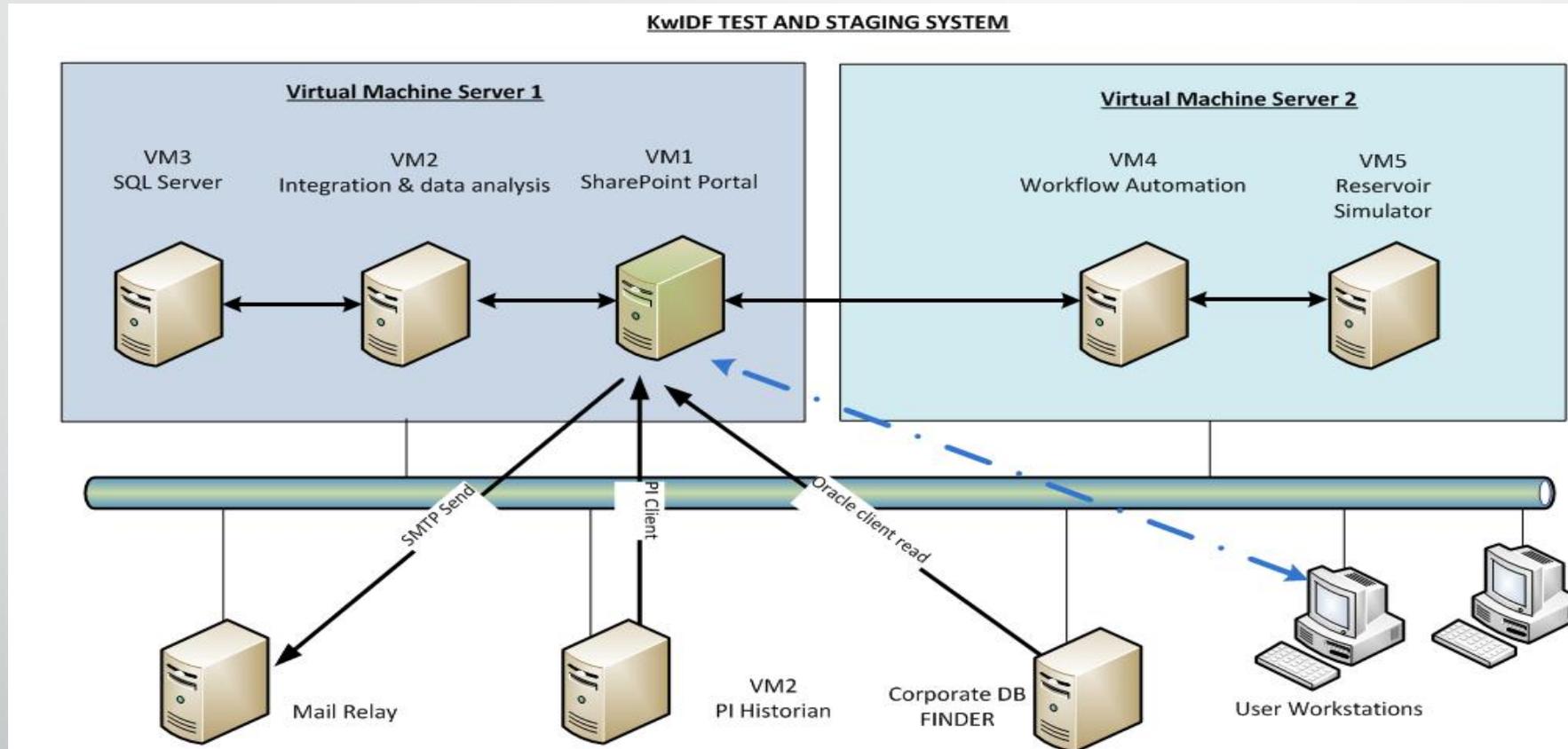
Art of engineering 1: CCTV over WiMax

The screenshot displays a live video feed of an industrial wellhead. The browser interface includes a toolbar with buttons for 'live', 'cameo', and 'setup'. The video feed shows a yellow and grey industrial structure. A Windows Task Manager window is overlaid on the feed, showing network utilization for 'Local Area Connection 2' and 'Local Area Connection'. The 'Local Area Connection 2' graph shows very low utilization (around 1%), while 'Local Area Connection' shows higher utilization (around 2.5%). The Task Manager window also shows a table of network adapters and their states.

| Adapter ... | Network Utilization | Link Sp... | State |
|--------------------|---------------------|------------|--------------|
| Local Area Conn... | 1.68 % | 1 Gbps | Connected |
| Local Area Conn... | 0 % | - | Disconnected |

- Use for Operations and maintenance purpose
- Low bandwidth – 256 kbps
- Compression without loose quality of live stream
- Multiple tests shows that bandwidth didn't affect quality due to compression algorithms

Art of engineering 2: Test and Staging Virtualization



- Test of the workflows and models, without disturbing main system
- Test updates and patches of the existing system
- Test new software revisions or versions of software

What is next in DOF

- Transformation of the DOF solutions to Platform solution
- Horizontal expansion to complete field wells
- Integration with subsurface engineering systems
- Integration with Production operation and maintenance systems
- Complete solution virtualization
- And many other new technologies advancements

发现

EVERYTHING HAS ITS BEAUTY, BUT NOT EVERYONE SEES IT
CONFUCIUS

Discover

7 *Japanograph*

开始

OF A GOOD BEGINNING COMETH A GOOD END.

Beginning