

# Shared Oil & Gas Well Management

Case studies from:

Shell Exploration & Production Co.

Petro-Canada North American Natural Gas



# Shell Exploration & Production Co.

Gulf of Mexico Operations





# Shell Exploration

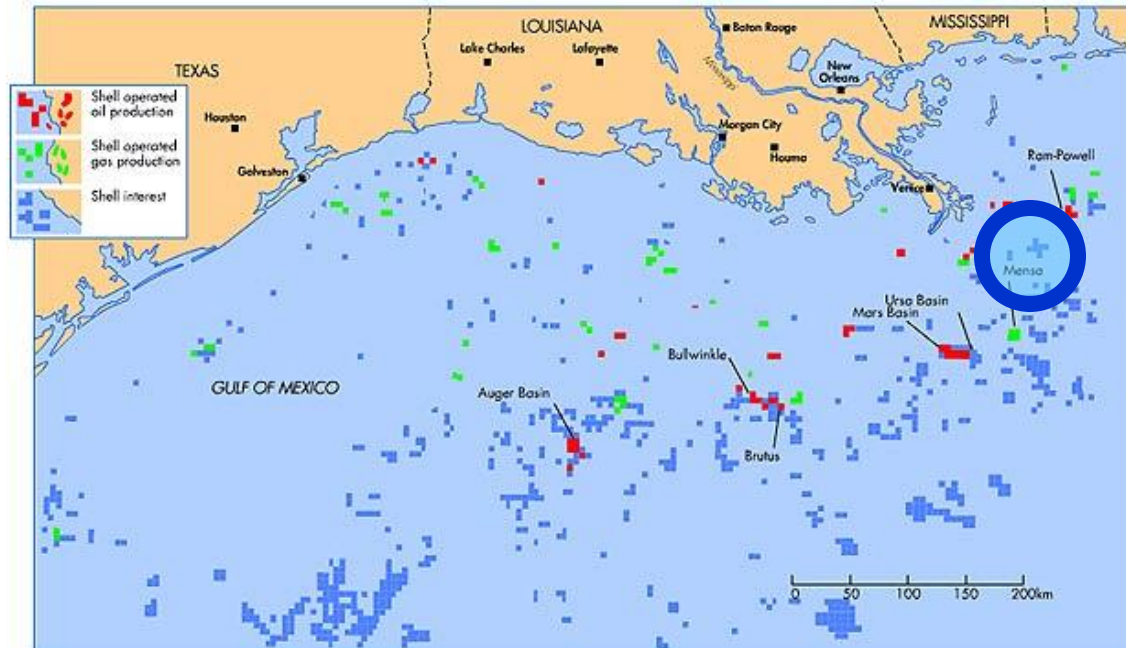
- Operates offshore oil exploration & production facilities worldwide:
  - Gulf of Mexico (7)
  - Austral-Asia (7)
  - West Africa (6)
  - North Sea (5)
  - Middle East (1)





# Gulf of Mexico Activities

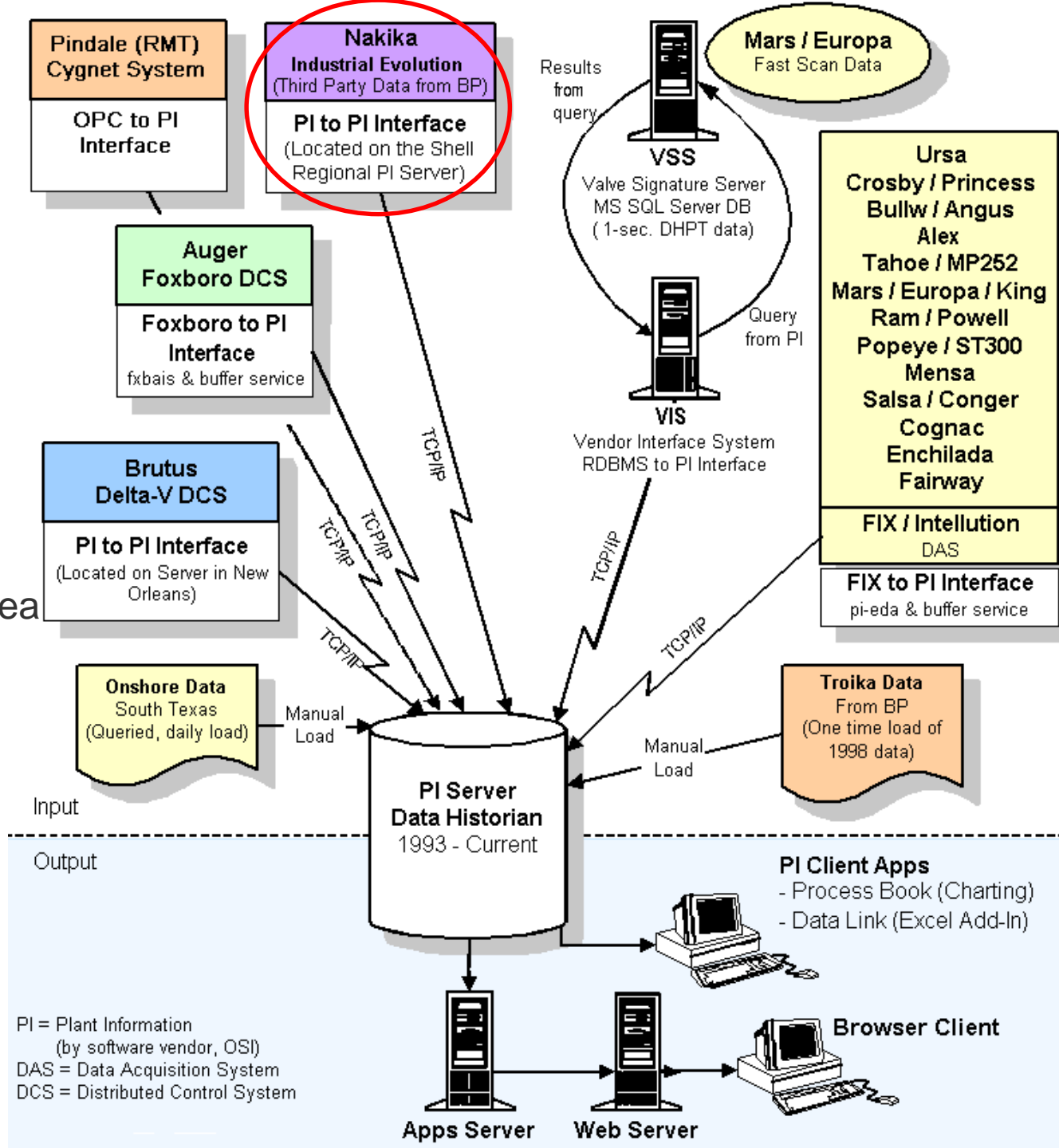
- Operates over 50% of deepwater production  
(Deepwater = over 1500' of water)
- Gulf of Mexico assets include:
  - 5 platforms
  - 15 subsea satellites





## U.S. PI Systems:

- ~20 locations sending data to Regional Shell PI Server(s)
  - Offshore GoM
  - US Rocky Mtn Area
  - South Texas
  - Future – Other Americas Assets





# Na Kika Field

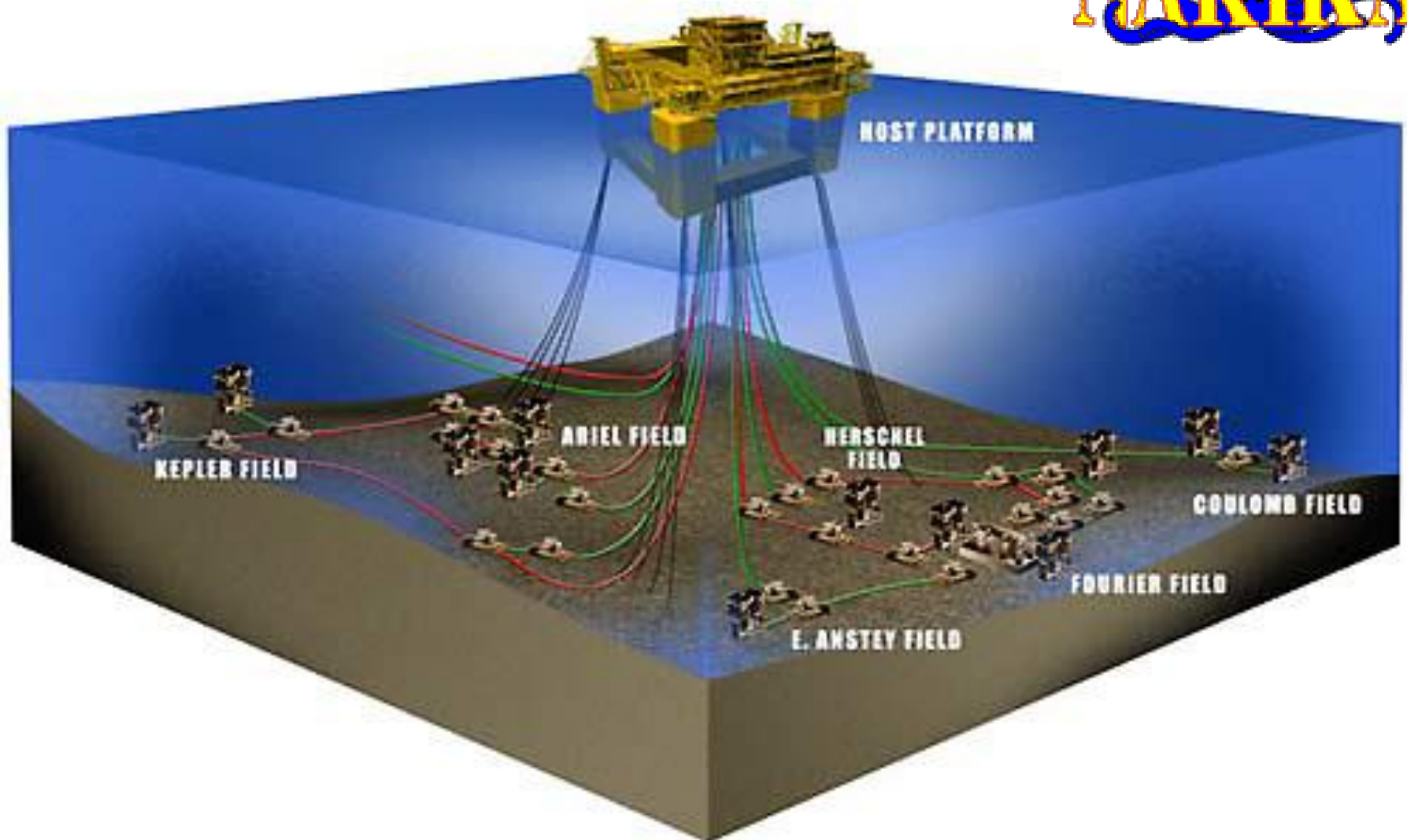
- Na Kika is Shell's newest production operation
  - Start-up in late 2003
  - 144 miles southeast of New Orleans
  - Sits in 7,600' of water (very deep)
  - Produces oil from 6 subsea satellite fields
  - Processing at the platform; oil & gas by pipeline to shore
- Production Targets
  - 110,000 barrels/day
  - 425MM cu.ft of gas /day
- Production Goal
  - 300,000,000 barrels of oil







# “The Mighty Octopus”





# Built in Korea







# 16,000 mile trip to Texas for commissioning & inspection





# ...then moved to the Gulf

- Semi-submersible, “floating” platform design, secured by wire ropes (6,600’ to 8,300’)
- Weighs **40,000 tons**
- 142’ high to the platform
- **335’x290’** platform size  
(3 football fields)
- Housing for 60 people
- **\$1.26 Billion**
- Joint venture with BP
- Setup by Shell;  
operated by BP



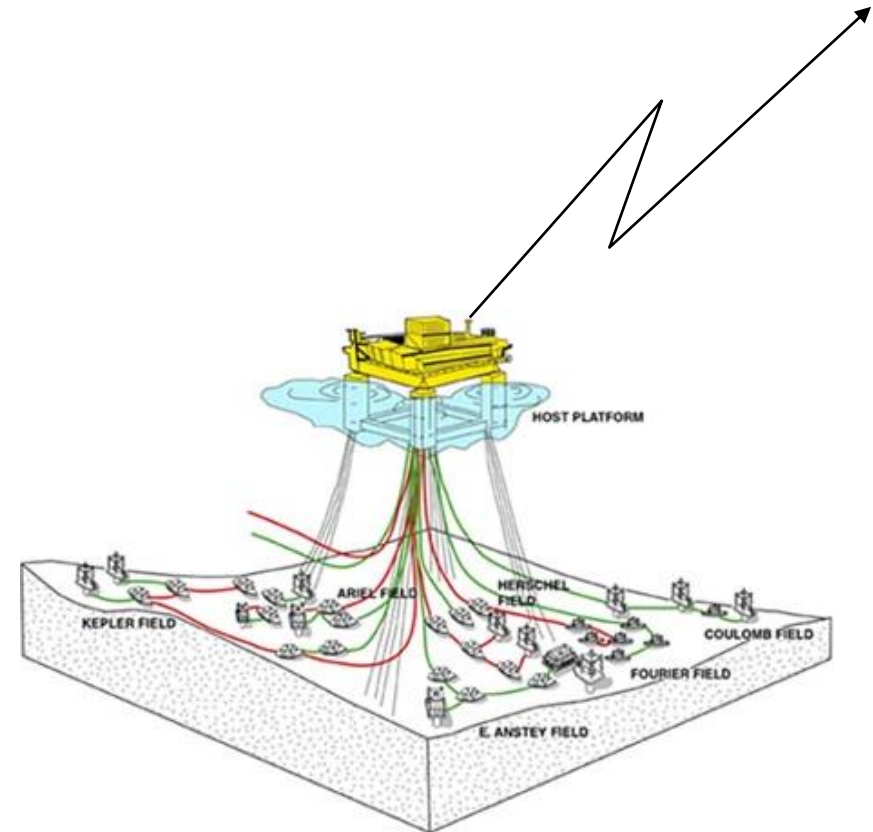
&





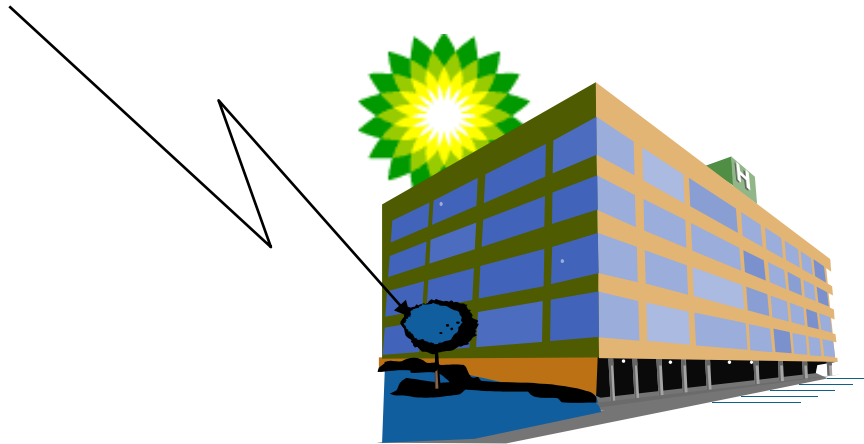
# Platform Operation

- Na Kika “topsides” is an oil & gas processing plant
  - Not unlike a complex on-shore gas plant
  - BP operated
- Platform’s control and information systems from Honeywell
  - Plantscape used for control
  - Includes PHD as a local data collector
  - On-shore communication via microwave





# How PI Fits



Houston

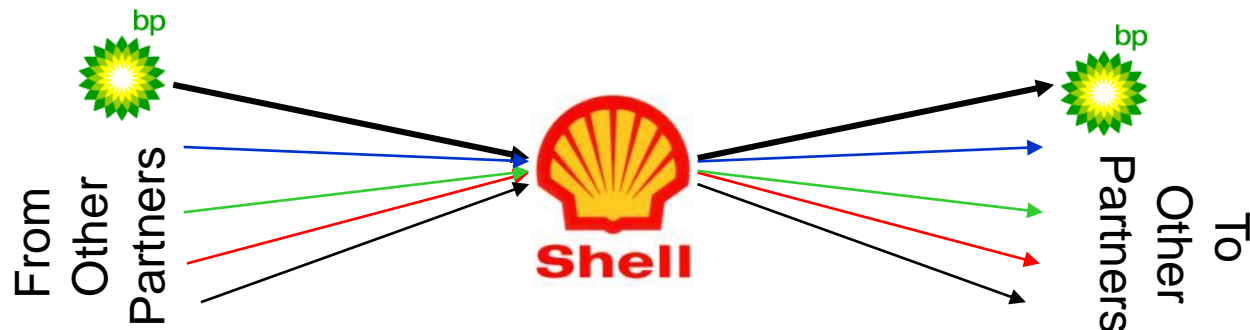
- Data replicated to BP's PI System onshore
  - PHD out puts flat files of history
  - Communication to Houston every 15 minutes
- Data resolution
  - Process data – 5-second to 1-minute
  - Fast scan data –  $\sim 1/5$  second
- PI sites behind BP's firewall





# Shell's Objectives

- Real-time data stream from BP
- Operate at arms length from BP (no direct connection of systems)
- No additional IT support burden
- Scalable solution
  - May want more data from other non-operated fields
  - May receive requests to provide Shell data to other partners
- Cost effective, reliable 3<sup>rd</sup> party service



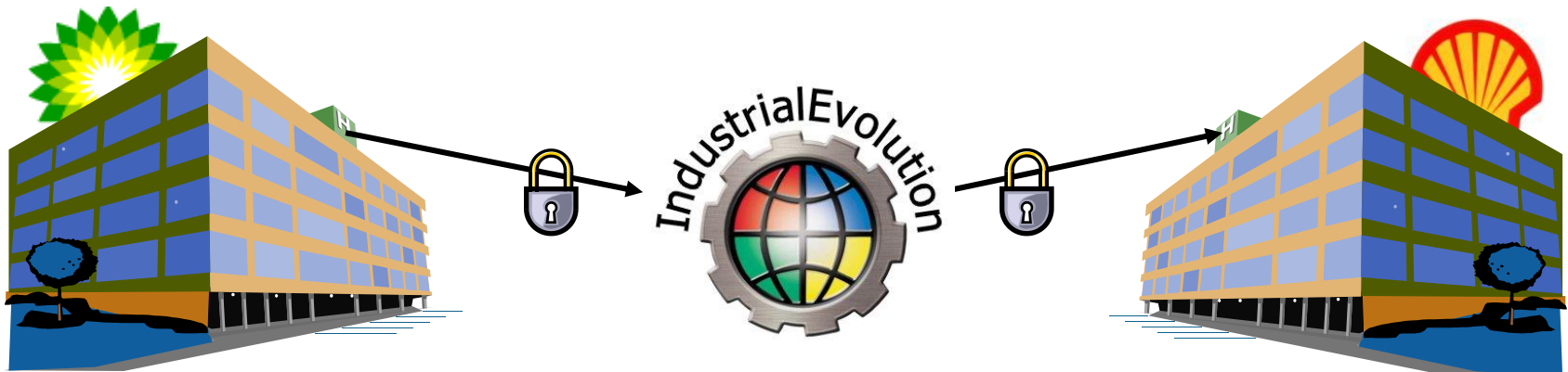




# How Industrial Evolution Fits

*Shell needs real-time data from BP...*

- Industrial Evolution provides the data sharing solution Shell requires
  - 2,000 process, 75 fast scan data points collected from BP
  - Routed through the Industrial Evolution Data Center
  - Individual VPN connections to both Shell & BP
  - Real-time data transfer using PI-to-PI over Internet via VPN
  - Sent to the PI System at Shell for storage & Shell client access





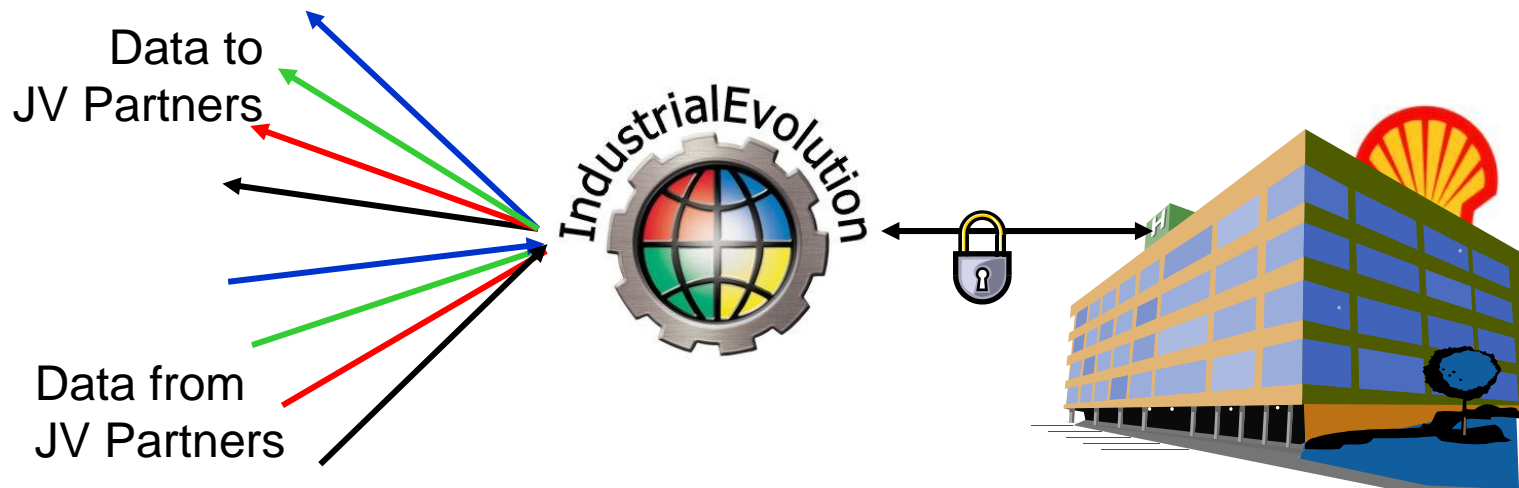
# Project Experience

- 9-months negotiation with BP
  - Commercial
  - Technical
  - Security
- Na Kika came on-line November 22, 2003
- Agreement reached between Shell & BP November 20, 2003
- Implementation complete by Industrial Evolution December 20, 2003
  - Procure, install & set-up VPN router for Shell
  - Set-up VPN via Getronics for BP
  - Establish PI-to-PI communication with Shell, then BP
- Data backfilling by batch file
- Fast scan tags added in January 2004



# Results

- Shell sees live data, just like BP
- No direct connection between Shell & BP
- Shell has a single, secure “pipeline” for data transfer
  - Can use the same pipeline to:
    - Pull in data from other joint venture operations
    - Send data out to joint venture partners
- Industrial Evolution service is good and solution works well



# Petro-Canada North American Natural Gas

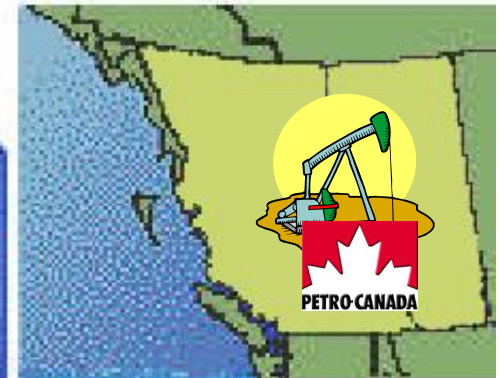
Western Canada Operations





# Petro-Canada Natural Gas

- Leading gas producer in Western Canada:
  - Operates 14 gas plants across Alberta & British Columbia
    - 65/35 split of gas ownership mix: Petro-Canada / Equity Partners
  - Produces 700 million cubic feet / day from thousands of wells
  - Holds over 2 trillion cubic feet in reserves
    - Represents about 8 years' production capacity
    - New fields being added each year at over 100%+ rate
- Equity participant in 13 additional gas plants
  - 9% of which is Petro-Canada owned



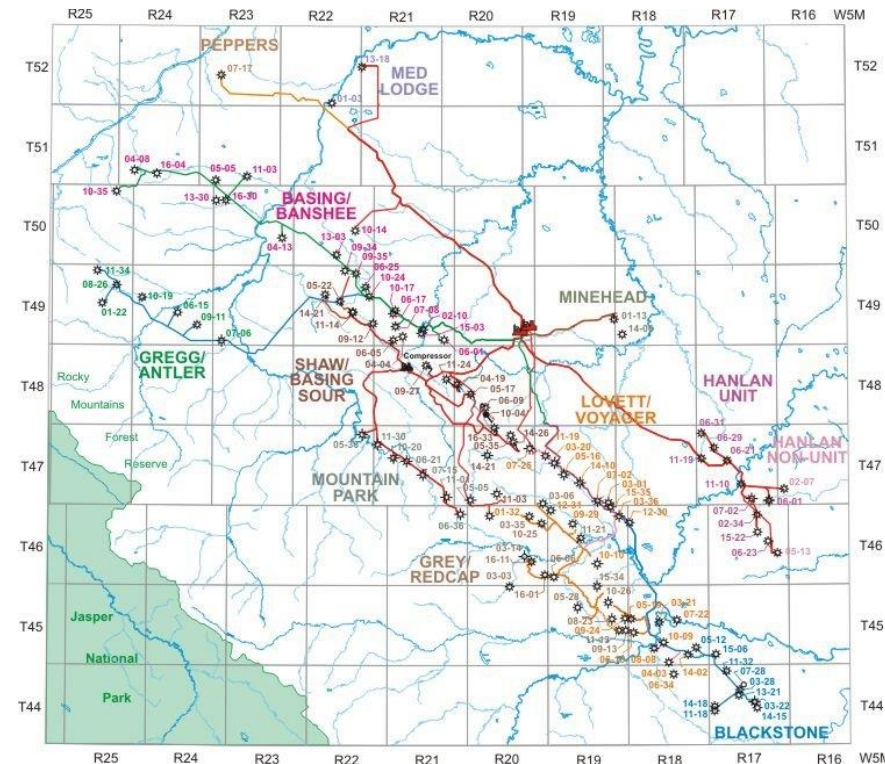


# Typical Field: Hanlan-Robb

- Hanlan-Robb is largest of the Petro-Canada gas plants
  - 424 million cubic feet of gas processing capacity
  - Collects and processes gas from wells across hundreds of miles
  - 45/55 split of gas ownership  
Petro-Canada / Equity Partners



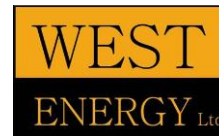
Typical gas well site





# Joint Venture Operations

- Petro-Canada operates with many equity partners



- Need current information about actual production operations for a holistic view across all assets (operated /non-operated)
  - Production optimization
  - Reporting
  - Planning
  - Forecasting



# How PI Fits

- Hanlan-Robb gas plant uses Fisher-Rosemount DeltaV
  - Includes an embedded PI System
  - Stores individual gas well meter data
- Head office & plants also use Honeywell PHD
  - Additional gas field data collected into this system
- Initial challenge:
  - Providing Petro-Canada staff with a unified view of gas well operations
- Ultimate challenge:
  - Getting selected data to each of the partners on-time and without extra effort





# Petro-Canada's Objectives

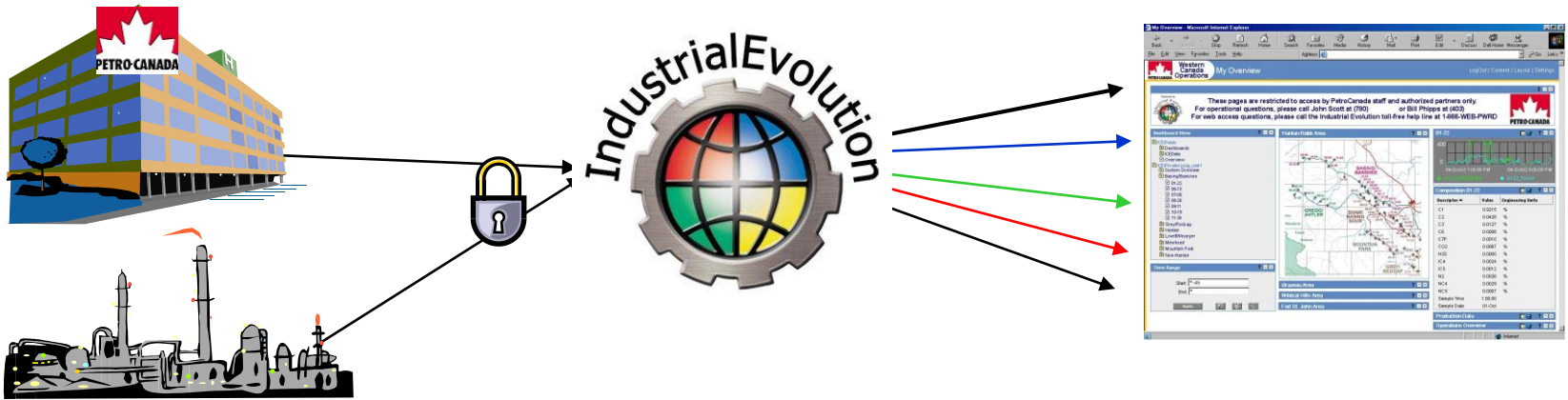
- Two objectives:
  - Unified view to real-time data from all gas wells across multiple fields and systems
  - No direct access to Petro-Canada systems by partners
- Additional objectives:
  - No additional IT support burden
  - Scalable solution
    - May want more data from other non-operated fields
    - May receive requests to provide Shell data to other partners
  - Cost effective, reliable 3<sup>rd</sup> party service





# How Industrial Evolution Fits

- Provides data sharing solution Petro-Canada requires
  - 1,243 data points stored in central PI System at the secure Industrial Evolution Data Center, updated every minute
    - 465 process data points collected from Hanlan DeltaV
      - VPN connection, running PI-to-PI for data transfer
    - 239 process data points collected from Calgary PHD
      - VPN connection, running PI-PHD Interface
    - 539 additional calculated data points
      - Includes averaging, totalization and other production calculations
  - Petro-Canada has full access and can annotate as necessary
  - JV partners access web pages with live data, per their privileges







# Project Experience

- Live data collection since December 2000
- Initial use for Petro-Canada users only
  - Significant operational savings captured just by making data available to off-site staff
- Partners access added in 2003+; more to follow

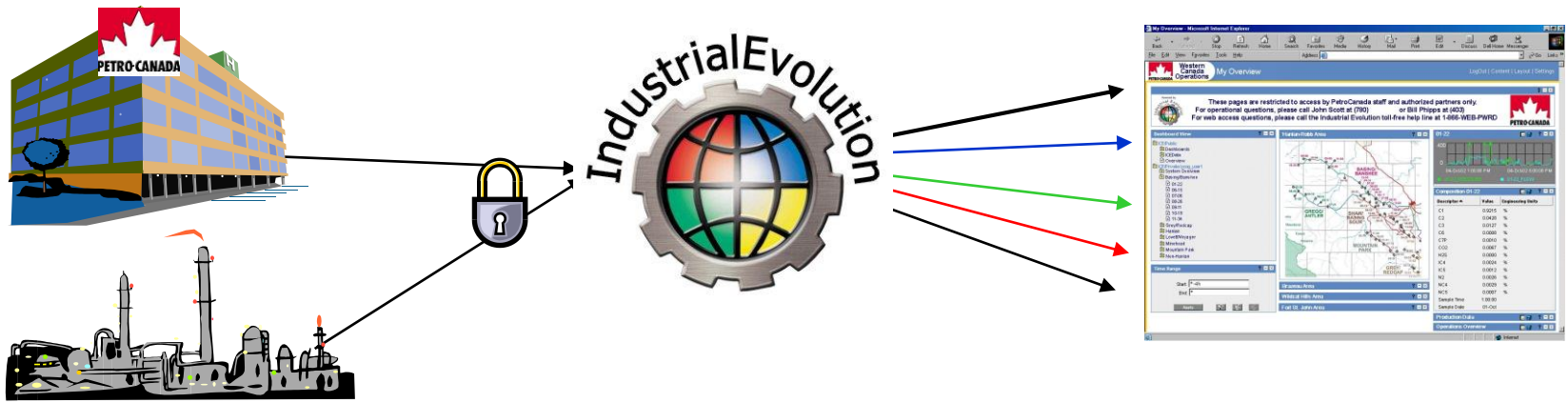


- Data collection scope has increased over time
  - Multiple systems connected to Industrial Evolution
  - All communications share a single VPN connection
- Excellent working relationship, very high level of trust
  - Industrial Evolution now manages partner data access on behalf of Petro-Canada
  - Significant data collection work outsourced to Industrial Evolution



# Results

- Petro-Canada has unified AnyWhere/AnyTime view
- Equity partners sees live data for the wells in which they have ownership, just like Petro-Canada
  - No direct connection between Petro-Canada & Partners
- Petro-Canada has a single, secure “pipeline” for data sharing, useful for
  - Pulling in data from other equity partner or own field operations
  - Sharing data with joint venture partners
- Industrial Evolution service proven & works well





# Industrial Evolution

- Data Sharing solutions apply to all industries
  - Oil & Gas
  - Pipeline
  - Power & Utilities
  - Paper
  - Chemicals
  - Other industries using PI
- Data Sharing possible from any source
  - PI, PHD, IP.21, etc.
  - PLC's, RTU's, etc.
  - Control systems
  - Any electronic form (XML, FTP, etc.)
- **300+ Companies now use Industrial Evolution**
  - Over 1,000 distinct site data connection points
  - Global coverage

# Questions?

