Paradigm – High Tech and Innovative Software Solutions for the Oil and Gas Industry


Matthieu Quinquet
Outline

- General information
  - Core activities and market
  - Company profile
  - Other market players

- Paradigm solutions for E&P workflows
  - E&P objectives and decision support tools
  - Software Solutions from Seismic Processing to Drilling

- Case studies
  - Exploration block offshore Africa (Ivory Coast)
  - Production field onshore US (Wyoming) – live demo

- Example of projects life-cycles and associated jobs
  - R&D: develop and market a new software
  - Operations: deploy a software suite for a client
Personal Background

- Sep. 2002: Masters in Petroleum Geosciences
  *ENSG, Nancy*

- 02-05: Technical consultant.
  *EarthDecision, Houston & Calgary*

- 05-07: Consulting team lead for Middle East operations.
  *EarthDecision, Dubai*

- 07-09: Business development manager of Reservoir Modeling Solutions for strategic accounts.
  *Paradigm, Paris*

- 2010-…: Technical director for Europe, Africa, Middle East and CIS.
  *Paradigm, Paris*
GENERAL INFORMATION
Paradigm Activities

- **E&P companies**
  - Optimize oil & gas recovery by making intelligent and responsible exploration, production and engineering decisions

- **What is Paradigm?**
  - International organization
  - Independent provider of software solutions
  - We help E&P companies improve workflow efficiency
### Paradigm Market

- **Oil and Gas industry**
  - Various disciplines from E&P asset teams in oil companies
    - Geophysicists
    - Geologists
    - Petrophysicists
    - Reservoir engineers
    - Drilling engineers
  - Oilfield services providers

- **Mining industry**

- **Water, environment…**
Over 550 Global Oil & Gas Customers

<table>
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<tr>
<th>Super Major Oil Companies</th>
<th>National Oil Companies</th>
<th>Independent Oil &amp; Gas and Service Companies</th>
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<tr>
<td>ConocoPhillips</td>
<td>BR PETROBRAS</td>
<td>Anadarko Petroleum Corporation</td>
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<td>Chevron</td>
<td>PEMEX</td>
<td>bhp billiton</td>
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<td>bp</td>
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<td>Total</td>
<td>Repsol YPF</td>
<td>DRI</td>
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<td>ExxonMobil</td>
<td>PetroChina</td>
<td>Marathon</td>
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<td>StatoilHydro</td>
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<td>Lukoil Oil Company</td>
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<td>Saudi Aramco</td>
<td>Fugro</td>
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Other Major Service Providers

- Integrated oilfield services providers: Schlumberger, Halliburton
- Well services providers: Baker Hughes, Weatherford
- Geophysical services providers: CGG, FUGRO, PGS…
- Software providers: Roxar, JOA, SMT, Beicip, CMG…
- Consulting services: Beicip Franlab, Senergy…
Paradigm History Timeline

1988 – Company founded
- First model-based imaging system

1991

1993

1997

1998
- NASDAQNM IPO

1999 – Acquisition of PTM division and petrophysical product line (Geolog) from Mincom

2000 – Acquisition of Flagship S.A. and Stramagic product line

2001 – Acquisition of Sysdrill Ltd. & drilling product line

2002 – Company acquired by Fox Paine – “going private” transaction

2003 – Unveiled EPOS™ data sharing & application interoperability middleware

2004 – Acquisition of RTD division from Core Labs
- First interpretation system enabling concurrent interpretation (SeisEarth)

2005 – New Leadership Team

2006 – CFO Appointed
- Acquisition of Earth Decision (EDS) and GOCAD product line
- First integrated rock and fluid solution

2007 – Next generation common reflection angle migration
- Introduced SKUA™ next generation adaptive modeling with geo-chronologic coordinate system

2008 – Unveiled next generation wide azimuth processing, imaging and interpretation
Company Profile – A Few Numbers

- Over 700 employees in more than 25 countries
- 8 R&D centers
- 4 operational regions
Three Main Functions

- R&D
  - Development
  - Q&A
  - Documentation
  - Training

- Corporate
  - Finance
  - Human Resources
  - Admin
  - IT

- Operations
  - Sales, Tech. Sales
  - Support
  - Marketing
Paradigm Organization: R&D

- Paradigm sustains a strong R&D effort
  - 8 R&D teams around the globe
  - ~ 200 staff (50+ PhD)

- Paradigm collaborates
  - With over 150 academic institutions around the world
  - Licensing agreements and partnerships with major Energy Companies
PARADIGM SOLUTIONS FOR E&P WORKFLOWS
Expected Outputs for Asset Teams

- High Quality Prospect Maps
- Drilling Targets
- Reserves and production forecasts
What a Reservoir Really Looks Like?
Limited and Uncertain Input Data

- Seismic data: seismic reflection, gravimetry…
- Well data: cores, wireline logs, production data, well tests, wellbore geophysics…
The Need for Geological Validation...

- Need to confront data to geological concepts coming from surface observations and measurements
  - Satellite images
  - Outcrops....
Illustrating Subsurface Uncertainties (1)
Structural maps of the Balcon field from two stages of development: (a) exploration prospect (1988, pre-Balcon-1 drilling) and (d) current interpretation (2006), based on two reprocessed 3D volumes.
Exploration

- Frontier exploration
- Complex structure and stratigraphy
- Low knowledge area
- Shallow geohazards, Pore Pressure
- Seismic “heavy”, well data “light”
- Importance of concepts
- Basin / regional scales
Development / Production

- Mature fields
- Well data “rich”
- Reverse production decline
- Rejuvenate reservoirs
- Infill drill existing reservoirs
- Exploit new reservoirs
- Advanced drilling and completion techniques
A Complete Solution for the Geoscientist

Expertise from Field Data to Reservoir

Imaging & Processing

Interpretation & Modeling

Well Planning & Engineering

Data Management & Interoperability

Reservoir Engineering

Reservoir Characterization Formation Evaluation

Paradigm
Software Solutions from Seismic to Simulation

Structural Interpretation

Structural Modeling

Stratigraphic Modeling

Stratigraphic Delineation

Geologic Interpretation

Formation Evaluation

Reservoir Modeling

Reservoir Engineering

Paradigm®
25 Years of Innovation and Still Going...

- Pre stack Depth Migration
- Voxel-based Interpretation
- 3D Propagator
- Neural Network Classification
- Petrophysical Multi-mineral Analyzer
- Full-Wave Equation Migration
- Shared Earth Model
- Cache-based 3D Interpretation
- Unstructured Modeling
- Full Azimuth Migration
EXAMPLES OF PROJECTS LIFE-CYCLES AND ASSOCIATED JOBS
R&D: Develop and Market a new Software

- **Identify need / develop concept**
  - Specifications
  - Project plan

- **Prototype / Alpha version**
  - Beta version

- **Release Candidate**

**Product managers**

**Project Manager / senior developers**

**Development team**

**Testing, training & documentation teams**

**Marketing**

**Tech. sales & support**

**Sales, admin....**
R&D: Develop and Market a new Software

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Release Candidate
Commercial Release

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Tech. sales & support

Sales, admin....
Operations: Deploy a Software Suite for a Client

Tender Bidding

Technical Evaluations
Pilot Project

Software Installation
User Trainings

Presentations
Live Demo

Commercial
Agreement

Onsite Support
Consulting

Account managers and Sales team

Technical Sales

Sales Admin and Licensing

Training & Support Teams

Onsite Consultants
Operations: Deploy a Software Suite for a Client

- Tender Bidding
- Presentations Live Demo
- Technical Evaluations Pilot Project
- Commercial Agreement
- Software Installation User Trainings
- Onsite Support Consulting

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