Biography

- **Jean-Charles Guilhem**
  - Jean-Charles Guilhem is the Chairman and President of 2B1st Consulting SAS, a firm that studies the Oil & Gas and Petrochemicals market.
  - From 2004 until January 2012, Mr. Guilhem served as the Group Vice President of Oil & Gas and Petrochemical at ABB Group, a Swiss based power and automation company
  - He also served as the Oil & Gas/Petrochemical Market Manager from January 1998 until April 2008.
  - Since January 2013, Mr. Guilhem is chairing the Petroleum and Chemical Industry Committee (PCIC) for Europe and the Middle East. PCIC is an organization designed to share best practices between end users, engineering companies and manufacturers of the oil & gas and petrochemical industry.
  - While at ABB Group, he generated 20% growth average per year in the oil & gas industry group and was part of the global leadership for automation products in the oil & gas and petrochemical markets.
  - Mr. Guilhem studied mechanical and automation engineering at Ecole Centrale Nantes and has an MBA from IAE Paris.

2b1st CONSULTING
See beyond, move first

Automation in the Oil & Gas and Petrochemical Sector

- **Introduction**
- **Key Definitions & Figures**
- **Key Technologies and Systems**
- **Opportunities along the oil and gas value chain**
- **Market players and competitive dynamics**

Who we are

Professionals of the Oil & Gas and Petrochemical industry holding management position in Lead Engineering companies and Manufacturers

- **2B1st Consulting**
  - **Experts** with 20 years experience in the **Oil & Gas and Petrochemical** industries at **Senior Management** positions
  - Developed **www.projectsmartexplorer.com** as unique internet on-line sales pursuit tool capable to **scan the projects** content by **business opportunities**
  - Provide a unique capability to **capture the supply chain** (End Users, Engineering & Services Companies, Manufacturers)
  - Understand the **technology break through** and **strategic processes** from inside
  - Support cross boarder **Merger and Acquisition** in the **Oil & Gas and Petrochemical** sector
  - Help to **establish companies** in Europe and the Gulf

Oil & Gas and Petrochemical Definitions & Key Figures

- **Some Definitions**
  - **Upstream:** **Exploration and Production of Oil & Gas Onshore and Offshore**
  - **Midstream:** **Transportation of the Oil & Gas from fields to transformation**
  - **Downstream:** **Refining and Petrochemical**
- **Key Figures**
  - **Upstream Capital Expenditure 2013:** **$1,000 billion (source: AIE)**
  - **Number of active projects above $100 million CAPEX:** **1,000 – 1,200**
  - **Number of drilling ships currently in project:** **150**
  - **From 700 projects of Project Smart Explorer Data Base**
    - **315 Upstream** projects represent **$1,014 billion CAPEX**
    - **72 Midstream** projects represent **$157 billion CAPEX**
    - **313 Downstream** projects represent **$542 billion CAPEX**
    - **52 Refinery** projects represent **$181 billion CAPEX**
    - **87 Projects** in **USA** represent **$290 billion CAPEX**
    - **51 projects** in **Saudi Arabia** represent **$54 billion CAPEX**

Automation in the Oil & Gas and Petrochemicals industry

- **Definition by field of competence**
  Products and Systems under the authority of the Instrumentation or Process Lead Engineer
  - **Advanced Management Systems** (Application Systems, Process Systems, Refining systems)
  - **Automation – Integrated Control & Safety System (ICSS)** (DCS, Safety System, Scada, Control package, Leak Detection, Emergency shutdown)
  - **Instrumentation** (Fire & Gas Device, Flow – Level – Pressure – Temperature Measurement, Recorders)
  - **Process Analytic** (Analytical Shelters, Chromatographs, Analyzers, Testing apparatus)
  - **Telecommunication** (Communication Systems, Data Transmission Systems, Public Address and General Alarm (PA/GA) System, Radio System, Weather System, Geo-positioning System, Security System)

  Are not included Electrical Power and Distribution Systems, Engineering and packaging work,

- **Market size**

	Project Smart Explorer Business opportunities (700 projects)	Yearly Market Estimation
– **Advanced Management Systems**	**$3 billion**	**$2 billion**
– **ICSS** (before integration and packaging)	**$20 billion**	**$12 billion**
– **Instrumentation (**excluding Valves)	**$5 billion**	**$3 billion**
– **Process Analytic**	**$3 billion**	**$2 billion**
– **Telecommunication**	**$7 billion**	**$5 billion**
– **Services**	**$17 billion**	**$12 billion**

Key Technologies and Systems (Digital Oil Field)

- **Deep Offshore Exploration**
  - **Geosciences, Reservoir data collection and analysis (CGG-Veritas, Schlumberger, Cameron, Halliburton)**
  - **High speed reservoir data analysis with world top 10 largest Cray type supercomputers (BP, Total)**
  - **New generation of drilling rigs (Chevron, Statoil)**
  - **All electrical pipelay vessels (ABB, GE, Keppel Fels, Technip)**
  - **Subsea (drilling, pump, compression, electrical power supply and distribution) (Aker Solutions, FMC Technologies, Cameron)**
  - **High pressure – High temperature – sulphur resistant equipment (Chevron, Total)**
  - **Risers heat tracing (Technip, ABB)**
  - **Remote control & monitoring (ABB, Kongsberg-FMC)**
  - **Arctic operations (Heat tracing, ice and iceberg monitoring) (Shell, Statoil)**
  - **Floating Liquefied Natural Gas (FLNG) vessels (Shell, Technip, Samsung, Petronas, DSME)**

Behind each Technology there is an automation system

Key Technologies and Systems (Digital Oil Field)

- **Unconventional resources (Shale gas, Tight oil)**
  (Junior companies, Schlumberger, CGG-Veritas, Cameron, Halliburton)
  - **Reservoir data collection and analysis**
  - **Drilling**
- **Fracturing (Junior companies, Schlumberger, CGG-Veritas, Cameron, Halliburton)**
  - **Water consumption, Waste water treatment, Phreatic water monitoring**
  - **Steam injection, Chemical injection, Seismic monitoring**
- **Enhanced Oil Recovery (EOR) (BP, Basf-Wintershall, Statoil)**
  - **Soft water treatment, Waste water treatment**
  - **Water injection, Chemical injection, Gas injection, CO2 injection**
- **Gas monetization (Shell, Tullow, GDF-Suez, Technip, ABB)**
  - **Flared gas capture, Gas-To-Power**

Behind each Technology there is an automation system

Key Technologies and Systems

- **Downstream**
  - **Giant Integrated Refinery & Petrochemical complex (Middle East, Asia)**
  - **Mixed crackers (crude oil and natural gas) (USA, Middle East)**
  - **Bio-Plastic, Bio-PET (Coca Cola, Nike, P&G, Ford, Japanese chemical companies)**
  - **Waste heat recovery (Organic Rankine Cycle (ORC)) (Ormat, Pratt&Whitney, TransPacific Energy)**
- **General trends (Upstream, Midstream, Downstream)**
  - **More safety and reliability call for the systems integration (Safety Integrity Level (SIL) certifications)**
  - **Local requirements**
  - **Low costs country sourcing (India, China, North Africa)**
  - **Inorganic growth led by vertical integration more than horizontal (Acquisition of expertise better than capacity)**

Behind each Technology there is an automation system

Opportunities along the Value Chain

- **Upstream Offshore**
  - **Subsea and Marine Application Systems**
    - **Subsea control system (integrated or not with ICCS) (Kongsberg, Cameron, GE)**
    - **Drilling robots (Badger Explorer) (Chevron, ExxonMobil, Statoil, Wintershall)**
    - **Dynamic positioning, Ballasting (Kongsberg-FMC)**
    - **Mooring (SBM Offshore)**
  - **Safety Systems and Assets Management Systems**
    - **Safety valves, Hips (High integrity protection systems) (Mokveld, Yokogawa)**
    - **ESD and F&G detectors (Honeywell, Siemens, Endress+Hauser)**
    - **Remote monitoring (traditional ICSS suppliers)**
    - **Vibration measurement and monitoring (Bentley-Nevada / GE)**
    - **Wells/Reservoir management (software houses)**
    - **Operator Training Simulators (Invensys, Yokogawa, Honeywell)**

Opportunities along the Value Chain

- **Upstream Onshore (Unconventional resources)**
  - **Drilling**
    - **Reservoir analysis (Cameron, Schlumberger,…)**
    - **Drilling performances (Junior companies, Halliburton, …)**
  - **Fracturing**
    - **Water consumption (no champion identified yet)**
    - **Steam injection (Junior)**
    - **Waste water treatment (Numerous companies)**
    - **Chemical injection (Dow, Basf)**
    - **Phreatic water monitoring (All Scada systems suppliers)**
    - **Seismic monitoring (Local business)**
  - **Assets Management Systems**
    - **Idem offshore**

Opportunities along the Value Chain

- **Midstream (Pipeline, Storage)**
  - **Material Tracking Systems, Leak detection (smaller software houses)**
  - **Remote Terminal Units (RTU) remote monitoring (Siemens, ABB, Schneider, Endress+Hauser/Rockwell)**
  - **Assets management, Corrosion detection (Honeywell), Machines monitoring (Bentley-Nevada/GE)**
  - **Security, Access monitoring (systems integrators), Safety systems (Invensys, Honeywell, Siemens, Endress+Hauser (storage))**
- **Downstream (Integrated Refinery and Petrochemical complex)**
  - **Major Process & Application Systems**
  - **Online Analyzers (Emerson, ABB, Siemens, Endress+Hauser/SpectraSensors/Kaiser Optical), Oil blending (Honeywell, Invensys, Yokogawa, Endress+Hauser)**
  - **Laboratory Information Management System (LIMS) (numerous players)**
  - **Process optimization (AspenTech, Honeywell), Catalyst usage optimization (IFP, Honeywell)**
  - **Assets and maintenance management (traditional ICCS suppliers)**
  - **Machines and vibration measurement and monitoring (Bentley-Nevada / GE)**
  - **Tank management (Emerson, Honeywell, Endress+Hauser), Oil movements (Honeywell, Invensys, Yokogawa)**
  - **Fertilizer (strategic alliance for integrated process – automation solutions) (KBR – Yokogawa)**

Market Players and Competitive Dynamics

- **New Business Models in the Oil & Gas and Petrochemical industry**
  - **Transfer in Upstream of added value from Majors to**
    - **Juniors (Anadarko, Genel, Noble, Tullow,…)**
    - **Fields service and drilling companies (Cameron, Halliburton, Schlumberger,…)**
  - **New comers (Consumer goods, Food & Beverage, Coal) (Nike, P&G, Coca Cola, Shenua)**
  - **Chemical companies going upstream (Basf - Wintershall, Dow Chemical - YPF)**
  - **Integrated Upstream-Downstream Business Model (NOCs, Shell)**
  - **Inorganic growth led by vertical integration more than horizontal (Invensys, Schneider-Electric) (Acquisition of expertise better than capacity)**

Market Players and Competitive Dynamics

- **New Business Models in the Automation**
  - **Technology**
    - **Evolution without revolution (risks adverse industry)**
    - **Booming application systems, mostly home-made by the overall application owner**
    - **Safety systems get everywhere, SIL certification required on everything**
    - **Cyber security**
    - **Unmanned platforms and all subsea solutions (Statoil, Shell, BP)**
    - **Vertical integration (Advanced System – ICSS – Safety System – Instrumentation – Telecom) against horizontal integration (ABB, Emerson, Honeywell)**
    - **Main Instrument Vendor (Measurement and Communication/Business System Integration – "Window into the Process" (Endress+Hauser)**
    - **Subsea systems standards to be aligned with surface systems standards for communication (Majors)**
    - **Flawless projects management and execution (challenge for all automation providers)**
    - **Automation enters electrical and power systems (ABB, Schneider, Siemens)**

Market Players and Competitive Dynamics

- **New Business Models in the Automation**
  - **Marketing and communication**
    - **Make the innovation benefits tangible and the risks manageable (Emerson)**
    - **Upstream leaders Emerson, Yokogawa, Honeywell, ABB**
    - **Midstream leaders: Emerson, Siemens, Honeywell, ABB**
    - **Downstream leaders: Honeywell, Invensys (Foxboro), Emerson, ABB, Yokogawa,**
  - **Global sourcing from the end users requires global reach from the suppliers**
    - **a challenge for niche players (Application Systems, Process Systems, Instrumentation)**
    - **an opportunity for leaders (ICSS and safety systems vendors)**
  - **Local content becomes a must, inviting companies to establish local capabilities**
    - **a challenge for niche players (Application Systems, Process Systems, Instrumentation)**
  - **High Value or Low Cost countries appear in vendor lists creating opportunities for new comers**
    - **Brazil (Smar)**
    - **China (Hollysys, Supcon)**

Questions ?

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