CO in KBC and Infochem:
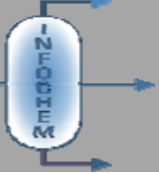# Current status and future plans

Mike Aylott and Richard Szczepanski – September 2012

September 2012

KBC

KBC provides independent consulting services, technology and implemented solutions to improve the long-term, sustainable profitability of our clients worldwide.
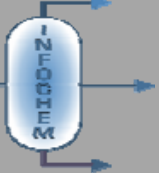
KBC Office Locations

KBC Approach

- Technology & Tools
- People
- Methodology

- Net Revenues: £38 million in 2007, £52.8 million in 2008, £55 million in 2009

- About 300 employees worldwide. KBC has established global non-exclusive collaboration agreements with leading engineering contractors

- KBC is continuously expanding its competencies through targeted acquisitions and alliances

- Client include worldwide leading companies in the oil & gas, refining, petrochemical, and other process industries as well as governments.

- Provide Independent, Objective Advice

- Enhance Capital & Asset Effectiveness

- Improve Operational Performance and increase Competitive Advantage

- Meet Individual Client Needs with Consulting, Implementation & Technology
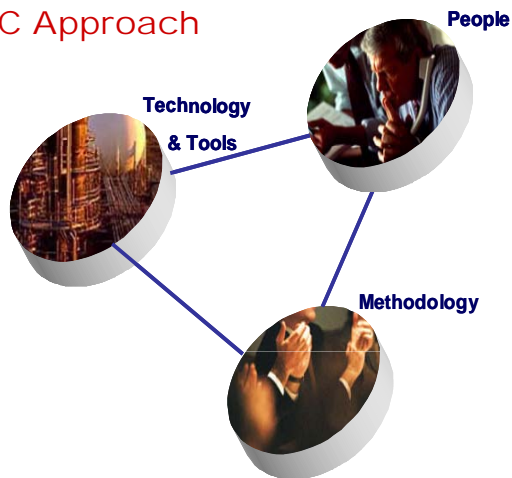
Core Software products:

- Petro-SIM and SIM Suite of Refinery Reactors
- ProSteam Toolkit and Utility System Optimization
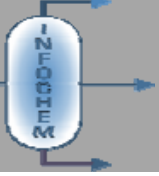- SuperTarget (heat integration)

Infochem

- Specialist providers of physical properties and thermodynamics software and consulting to the energy and chemicals industries

- Established in 1986

- Based in London with staff of 10 people

- Focus on upstream oil & gas

- Core product: Multiflash

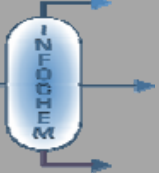- Active participants in CAPE-OPEN since 1999
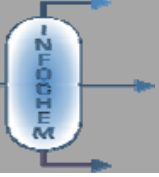
KBC + Infochem

- KBC acquired Infochem in June this year

- Key step for KBC in expanding our service and software offerings to upstream oil and gas

- Acquisition allows us to pool our respective strengths in hydrocarbon characterisation and deliver on our vision of unified process simulation across upstream and downstream

- Petro-SIM is a full-featured, graphical process simulator designed primarily for refineries and petrochemical plants

- The only available product that can solve the refinery wide model with 1st principle rigor – it can model "crude to products"

- Provides the ability to model a valve, an FCC unit or the whole refinery – complete scalability

- One tool capable of many uses – design, optimization of existing assets, evaluation of different operating strategies, economic planning support

- Petro-SIM includes rich range of detailed refinery reactor process models

  - All major refinery processes covered – FCC, Hydroprocessing, naphtha reforming, thermal cracking and more

  - Corporate standard of many refiners worldwide

- Models serve applications in

  - Off-Line Analysis and Decision Support

  - LP Data Generation

  - Unit Monitoring

  - On-Line Optimization (RTO)
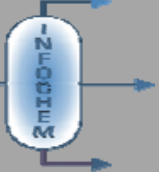
Petro-SIM and CO

- Petro-SIM has supported CO Unit Operation standard since 2008
    - Used quite extensively for integration with commercial 3rd party products for applications in heat exchanger rating/design and CFD analysis
    - Seeing some demand by our clients for CO as way to integrate their own technologies

- Petro-SIM as of June this year supports the CO Property Package 1.1 specification
    - Used as vehicle for integrating Multiflash
   - Showing early benefits in combined KBC+Infochem consultancy
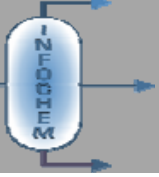
- Comprehensive phase behaviour package
  - multi-phase fluid/solid capability
  - standard models for oil/gas/petrochemical/polymer applications
  - Petroleum fluid characterisation (pseudocomponents and property matching)
- Upstream modules
  - Flow assurance modules for hydrates/waxes/asphaltenes/solid freezeout
  - High accuracy model for: natural gas, CO_2, light hydrocarbons, water, refrigerants, etc….
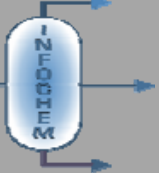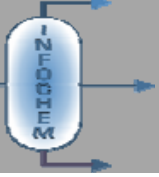
Multiflash in CAPE-OPEN

- Supports CO Thermo Spec 1.0 and 1.1
- Includes Property Package Manager and Property Packages with persistence and editing support
- Uses Multiflash GUI to configure PP
- Full multiphase gas/liquids/solids capabilities available through the CO 1.1 version
- Supports all (useful):
  - Phases
  - Properties
 - Derivatives
  - Flashes, etc….
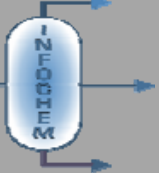
- Mercury in natural gas/oil processing (5 phases: VLWLS)

- BP Cold Flow process - hydrates handling in sub-sea flowlines
  (6 phases: VLWIH1H2)

- Wax deposition in sub-sea flowlines (4 phases: VLWS)

- Polymer production (4 phases: VLLS)

- Hydrate inhibitor partitioning (VLW)

Demo: Petro-SIM and Multiflash

- HP compressor train in gas processing facility
- Uses Multiflash mercury model to track mercury distribution
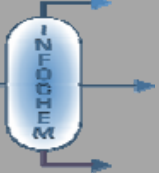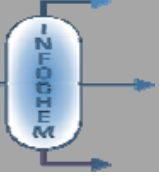
Future plans: Petro-SIM

- Update product as needed to support changes in the property package and unit operation specifications
  - End-user demand is a key motivator for us

- Refinery Reactors
  - Obviously a core area of interest for KBC
  - We will add support to Petro-SIM for this emerging standard
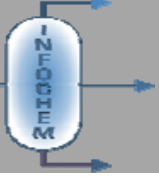
Future plans: Multiflash

- 64 bit Windows support including CO

- Compound data interface (compound & correlation server) ?

- Wider support of non-Microsoft platforms

- PVT lab experiments

- Model developments
    - Mercury
    - Electrolytes
    - PC-SAFT

CO Thermo developments

- Some personal ideas…

- Reducing computational overheads
  - Integers instead of strings
  - Direct calculation methods that avoid using the MO (eg. CalcAndGetLnPhi)

- Calculations
  - Critical point
  - Cricondentherm & cricondenbar
  - Phase boundaries

- Flash derivatives
  - Derivatives of flash outputs wrt flash specifications *with phases in equilibrium*
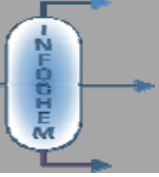
Summary / Conclusions

- Our demonstration shows the clear value of CO
  - Used Multiflash thermo for functionality not readily available in Petro-SIM
  - Making Petro-SIM support CO Property Packages was straightforward
- KBC and Infochem are committed partners for CO