

# **CO-LaN Activities Report 2016/2017**

**Richard BAUR, representing Shell  
CAPE-OPEN 2017 Annual Meeting  
BP, Sunbury-on-Thames, UK  
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# CO-LaN Activities Report 2016/2017

## ◆ CO-LaN Overview

- ⇒ Current Members & Management Board
  - Membership approval process
- ⇒ Contracts and Software Licences

## ◆ Usage & awareness

- ⇒ Website, forum, new publications, Wiki entries & training

## ◆ Special Interest Groups: overview and deliverables

## ◆ Strategic activities:

- ⇒ Quality assurance of standards (versioning, review process)
- ⇒ CAPE-OPEN certification
- ⇒ Consultancy Service Scheme
- ⇒ CAPE-OPEN middleware (COBIA)

# CO-LaN Overview – Membership

- ◆ **As of October 2017 more than one hundred Members**
  - ⇒ 6 Full Members
  - ⇒ 79 Corporate Associate Members
    - 49 Suppliers
    - 27 Academics
    - 3 Public & Federal Agencies
  - ⇒ 22 Individual Associate Members

# CO-LaN Overview – Membership

## ◆ TOTAL left CO-LaN as of December 31, 2016

*“... TOTAL has had a very good experience with CO-LaN over the past many years...having discussed with TOTAL in-house stakeholders, it has been concluded that TOTAL’s interest in CAPE-OPEN standards has decreased since then. ...”*

Philippe BAPTISTE, TOTAL Chief Technology Officer

## ◆ Optimized Gas Treating, Inc joined as of September 21, 2017

*ProTreat is the software package for simulating acid gas removal specifically with aqueous alkanolamines. ProTreat software is implementing a mass and heat transfer rate approach to column modeling and now includes a number of proprietary solvents, physical and hybrid solvents, dehydration, sour water stripping, and most recently a full sulphur plant simulator.*

# CO-LaN Membership

- ◆ **CO-LaN appreciates very much the activity shown by a number of Members.**
- ◆ **CO-LaN expects each Member to assist in its missions and to contribute to its life.**
- ◆ **CO-LaN prepares internal rules to support these objectives:**
  - ⇒ Track activity and assess interest
    - Ensure up-to-date contact information
  - ⇒ Membership approval process
  - ⇒ Application of these rules may lead to a smaller, but more active community.

# CO-LaN Overview - Management Board

- ◆ **Responsible for day to day running of CO-LaN**
- ◆ **Composed only of representatives of Full Members**
- ◆ **Management Board (current)**
  - ⇒ Shell Global Solutions      Richard Baur      President and Secretary
  - ⇒ Air Liquide                      Philippe Arpentinier      Treasurer
  - ⇒ BASF                                  Peter Mauer
  - ⇒ BP                                      Mick Lee
  - ⇒ Dow                                    Isaiah Huang
  - ⇒ Linde                                  Oliver Koch
- ◆ **Monthly conference calls, plus twice yearly physical meetings and additional meetings on specific topics.**

# CO-LaN Overview - Contracts & Licenses

## On-going year-long contracts awarded by CO-LaN

### ◆ Michel Pons Technologie, CTO

- Oversees and participates in SIG activities
- Reports to Management Board on SIG work progress
- Provides editorial content to website
- Administers the repositories, the forum and the website
- Writes and distributes the CAPE-OPEN newsletter
- Maintains contact with membership
- Organizes CAPE-OPEN Annual Meetings
- Conducts interoperability testing and reports to parties involved
- Responds to inquiries about CO-LaN and CAPE-OPEN
- Advises Management Board on administrative issues

# CO-LaN Overview - Contracts & Licenses

## On-going year-long contracts awarded by CO-LaN (continued)

### ◆ Michael Halloran

- ⇒ COLTT & Type Libraries/Primary Interop Assemblies
  - Active within Interoperability SIG

### ◆ Stenhouse Simulations Ltd

- ⇒ Secretarial support
- ⇒ Versioning
- ⇒ Dissemination (CAPE-OPEN Wiki page)



# CO-LaN Overview - Contracts & Licenses

## ◆ Licenses for testing & demonstration

- ⇒ *All major vendors have continued to provide licenses to CO-LaN*
  - *For testing & demonstration purposes*

***Results of the testing are kept confidential to the vendor, the CO-LaN contractors and the Management Board***

# CAPE-OPEN usage and awareness

## ◆ Numerous articles refer to, or use CAPE-OPEN, e.g.

- Prospects of using equilibrium-based column models in dynamic process simulation of post-combustion CO<sub>2</sub> capture for coal-fired power plant; *R Dutta et.al., Fuel 202 (2017) 85–97*
- Re-evaluating the CPA EoS for improving critical points and derivative properties description; *M.Palma et.al., Fluid Phase Equilibria 436 (2017) 85-97*
- Utilization of blast furnace flue gas: Opportunities and challenges for polymeric membrane gas separation processes *A. Ramirez-Santos, Journal of Membrane Science 526 (2017) 191–204*
- Automatic model reduction of differential algebraic systems by proper orthogonal decomposition; *Computers and Chemical Engineering 97 (2017) 104–113*

**Extensive list of publications can be found**

**<http://www.colan.org/category/techpapers/>**

# CAPE-OPEN usage and awareness

## ◆ Interop SIG

⇒ **CAPE-OPEN Type Libraries installers – Developer Guide**

(published in February 2017)

⇒ **Telecom on the Developer guide (Feb 2017)**

## ◆ Methods & Tools SIG

⇒ **Public release of COBIA phase I**

# CO-LaN Repositories

## CO-LaN uses repositories for

- Storing working documents of SIGs
- Delivering CO-LaN software and documentation
  - Tools such as COLTT or TLB/PIA installers
  - Project deliverables: COBIA
  - Examples, complete documentation sets
- Managing software development
  - COLTT
  - COBIA
  - TLB/PIA installers...



# Wiki entry for CAPE-OPEN

## ◆ CAPE-OPEN Wikipedia has been published



The screenshot shows the Wikipedia article for "CAPE-OPEN Interface Standard". The page includes the Wikipedia logo, a navigation sidebar with links like "Main page", "Contents", and "Help", and the article content. The article title is "CAPE-OPEN Interface Standard". Below the title, it says "From Wikipedia, the free encyclopedia". The main text states: "The **CAPE-OPEN Interface Standard** consists of a series of specifications to expand the range of application of process simulation. CAPE-OPEN specifications comprise a set of software interfaces that allow plug and play inter-operability between a given Process Modelling Component (PMC) and a third-party Process Modelling Component (PMC)." Below the text is a "Contents" table of contents with 8 items: 1 Origins, 2 Purpose, 3 Concepts, 4 Support, 5 CAPE-OPEN Specifications, 6 Software Tools, 7 Future Developments, and 8 References. The page also shows a "Not logged in" status and a search bar.

**Member edits encouraged**

# CO-LaN website

















- ◆ Over 800 Posts
- ◆ Subscribe via RSS



- ◆ Please browse and comment
  - ⇒ Continuous update on SIG activities
    - Will hopefully induce more participation in SIGs
  - ⇒ Check posts on your PMEs and PMCs: need updating
  - ⇒ Search engine available

# CAPE-OPEN forum

- ◆ **Target audience: mainly developers**
- ◆ **In active use for support queries**
  - Number of users: 169 (135 last October)
  - Number of topics: 305 (241)
  - Number of posts: 1640 (1420)
  - One post per business day

GENERAL	TOPICS	POSTS	LAST POST
 <b>Howto</b> IMPORTANT: PLEASE READ ABOUT RULES AND TIPS ON HOW TO USE THE CAPE-OPEN FORUM NOTICE: CAPE-OPEN 2016 ANNUAL MEETING ANNOUNCED IN DISSEMINATION ACTIONS FORUM	5	9	by jasper  13 June 2017, 09:10
FORUM	TOPICS	POSTS	LAST POST
 <b>Process Modelling Components</b> Discusses use of CAPE-OPEN compliant Process Modelling Components Moderator: jasper	37	163	by jasper  30 September 2017, 17:16
 <b>Process Modelling Environments</b> Discusses use of CAPE-OPEN compliant Process Modelling Environments	213	1329	by jasper  25 September 2017, 21:37
 <b>Implementation and development</b>	19	101	by colancto  17 March 2017, 10:45
 <b>CAPE-OPEN Interface specifications</b>	3	12	by bcbooo  03 March 2016, 01:23
 <b>Activities of Special Interest Groups</b> Contains discussion threads managed within each Special Interest Group at CO-LaN	19	19	by colancto  15 August 2017, 18:23
 <b>Dissemination actions</b> Discusses opportunities to communicate about use and implementation of CAPE-OPEN interfaces in PMCs and PME	11	13	by colancto  17 July 2017, 10:51
 <b>News</b> CAPE-OPEN related news	2	9	by jasper  25 September 2017, 07:21

# Overview - SIGs

- ◆ **Responsible for maintenance and development of CAPE-OPEN interface standards**
- ◆ **Representatives of both Full and Associate Members**
  - ⇒ Interoperability
    - Leader: Malcolm Woodman
  - ⇒ Methods & Tools
    - Leader: Bill Barrett (USA EPA)
  - ⇒ Thermodynamics
    - Leader: Sergej Blagov (BASF), Jasper van Baten (AmsterCHEM)
  - ⇒ Unit
    - Leader: Krishna Murthy PENUKONDA (Schneider Electric)
    - Includes Refinery Reactors



# Overview - SIGs

- ◆ **Involvement in SIG meetings represents:**
  - ⇒ Thermo: 8 man-hours per month
  - ⇒ UNIT: 1 man-hour per month (moving to 2)
  - ⇒ Methods & Tools: 4+ man-hours per month
  - ⇒ Interoperability SIG: 1 man-hour per month
- ◆ **Plus whatever is done outside meetings...**
- ◆ **Tendency is to do more outside online meetings**

# SIG activities

## ◆ Thermo SIG

- ⇒ Chemical Reaction interface specification redesign
- ⇒ Recommendation for COBIA Phase II scope

## ◆ UNIT SIG

- ⇒ Petroleum Fractions interface specification
  - Implementation in PRO/II and Shell
  - Progress description
  - Need to work with Thermo SIG for thermo requirements (lower priority)

## ◆ Interoperability SIG

- ⇒ Release of 64-bit version of COLTT
- ⇒ Production version of TLB/PIA installers

# SIG activities

## ◆ **Methods & Tools SIG**

### ⇒ Common interfaces

- Limited feedback on Errata and Clarification for Utilities
- Preparing final version and answers to comments

### ⇒ Flowsheet Monitoring

- Nearing Request For Comments stage

### ⇒ CAPE-OPEN Object Model (COBIA)

- Phase II funded and delivered (separate presentation)

**All SIGs are delivering technical progress**

**Very regular conference calls**

weekly for Thermo,  
monthly for UNIT and Interop,  
three times/month for M&T

# Consultancy Service Scheme (2016)

## ◆ Awarded to Intelligen, Inc.

- ⇒ Initial scope was extended – budget increased (×5)
- ⇒ Will consist of
  - Generic CAPE-OPEN Unit Operation socket
  - Command line driver of UO socket
    - To illustrate the implementation in SuperPro Designer
  - Thermo socket based on Ideal Gas Property Package
    - Derived from code already made public
- ⇒ Delivery before end of 2017

**Code of UO socket is generic and owned by CO-LaN  
and will be made available to Members on request**

# Quality assurance of specifications

- ◆ Management Board intends to:
  - unify the labelling of textual CAPE-OPEN specifications
  - maintain only the most recent version
  - make it easier for newcomers to adopt CAPE-OPEN
  - increase traceability of changes through versioning
  
- ◆ **Pending Actions:**
  - Asks all SIGs to evaluate consequences of unification around 1.1 on textual documents, TLBs, developers and end-users
  - Asks M&T SIG to develop a proposal on versioning

# Deprecating Thermo Version 1.0

## ◆ Context

- ⇒ Thermo v.1.0 has not been changed since 2011
- ThermoSIG formally requested deprecation of Thermo v1.0 in 2014
  - we consulted vendors, one vendor requested more time
- ⇒ Vendor can continue to support implementations of Thermo v1.0
- ⇒ *n.b.* Deprecate means stop support for, not delete

## ◆ Decision

- ⇒ Deprecate Thermo v1.0:
  - Stop maintenance of Thermo v1.0 (no more errata and clarifications) [Dec 31 2017]
  - Stop funding consultancy service scheme cases for Thermo v1.0 [Dec 31 2017]
  - Stop distribution of Thermo v1.0 in type libraries, PIAs [Dec 31 2019]

## ◆ Recommendation

- ⇒ vendors to move to v1.1
- ⇒ vendors to consult user base before leaving Thermo v1.0

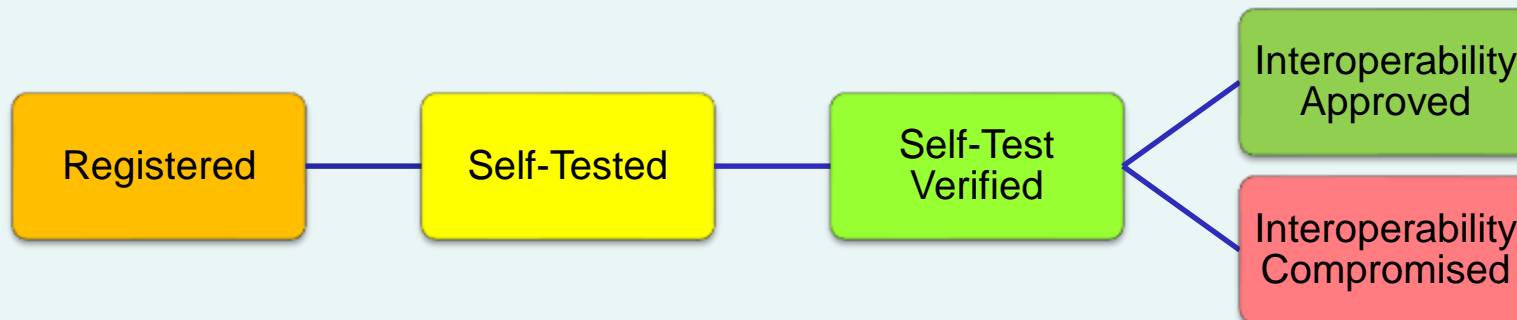
# Launch of CAPE-OPEN Certification

## First actions are:

- ◆ **Testing suite will be developed** for self testing PMC/PME.
- ◆ Develop Certification SIG **Charter**
- ◆ Collecting feedback and **interested SIG members**

## How it will work:

- ◆ **CCO** will lead Certification SIG, test suite development and act as mediator.
- ◆ **Certification SIG will be established** to define test procedure and refine the terms & conditions of the certification.
- ◆ **Certification website** will keep the larger community up-to-date on the actual interoperability.



# COBIA development project

## ◆ Objectives and benefits of CAPE-OPEN new middleware:

### ⇒ Platform-independent middleware

- New technology by CO-LaN
- Will replace COM

### ⇒ Facilitates implementations in C++ and other languages

- More accessible to developers

### ⇒ Faster interface speed

### ⇒ Open source

- Non proprietary technology



# COBIA development project

- ◆ **Phase I completed: demonstrated feasibility**
- ◆ **Phase II delivers beta version and documentation**
- ◆ **Board will decide on starting phase III**  
**(after feedback and prototyping by vendors/developers)**
  - Marshaling Between Different Platforms: enables interoperability between 32-bit components, 64-bit components, and components inside Virtual Machines such as .NET.
  - Documentation of COBIA: *Creation of manuals, examples, references and interface specific documents for COBIA.*
  - Distribution and Support of COBIA: *On-going online distribution of the COBIA software. Optimization and maintenance of code as needed.*

# Conclusions & Perspectives

## ◆ Review of Milestones from AGM 2016:

### ⇒ Deprecating Thermo version 1.0 (Q4 Y17)

- ✓ Decision on 2016 Consultancy Scheme (Q1 2017)
  - Awarded to Intelligen. Deliverable: reusable UO socket
- ✓ Roadmap for CAPE-OPEN certificate & test suite (Q1 Y17)
  - Developed a roadmap
- ✓ COBIA phase II completed by AGM 2017
  - Phase II launched and beta released

# Conclusions & Perspectives

## ◆ Milestones for 2018:

### ⇒ CAPE-OPEN certification

- Develop charter for SIG
- Start to develop self-testing suite

### ⇒ COBIA assessment of phase II

- Next steps: analyze, prototype, implement

### ⇒ 2018 Consultancy Service Scheme

- Watch the CO-LaN website for announcement
- Start preparing applications

# How you can help

- ◆ **Develop your requests for consultancy scheme 2018**
- ◆ **Contribute to CAPE-OPEN certification process**
- ◆ **Contribute solutions for CAPE-OPEN self-test suite**
- ◆ **Evaluate and feedback on COBIA Phase II**
- ◆ **Participate in SIGs**
- ◆ **Feedback on website and CAPE-OPEN wiki page**
- ◆ **Promote CAPE-OPEN to your colleagues & customers**