

CO-LaN Activities Report 2022

**AGM of CO-LaN 2022
Onsite/Online Meeting
September 21, 2022**

CO-LaN Activities Report 2021/2022

❑ CO-LaN Overview

- ⇒ Membership and Management
- ⇒ Operations

❑ Usage and awareness

- ⇒ Website, forum, publications

❑ Special Interest Groups

- ❑ Summary reports

❑ Strategic activities

- ⇒ CAPE-OPEN distribution (TLB/PIA)
- ⇒ CAPE-OPEN middleware (COBIA)
- ⇒ CAPE-OPEN certification
- ⇒ CAPE-OPEN 2.0

CO-LaN Overview: membership

❑ As of September 2022 almost one hundred Members

- ⇒ 6 Full Members
- ⇒ 65 Corporate Associate Members
- ⇒ 24 Individual Associate Members

❑ New Associate Members 2021/2022

- ⇒ Group B

ECA Engineering (Jens Peter HANSEN)

- ⇒ Group C

Upstream Development and Engineering Inc. (Joon SONG)

CO-LaN Overview: membership

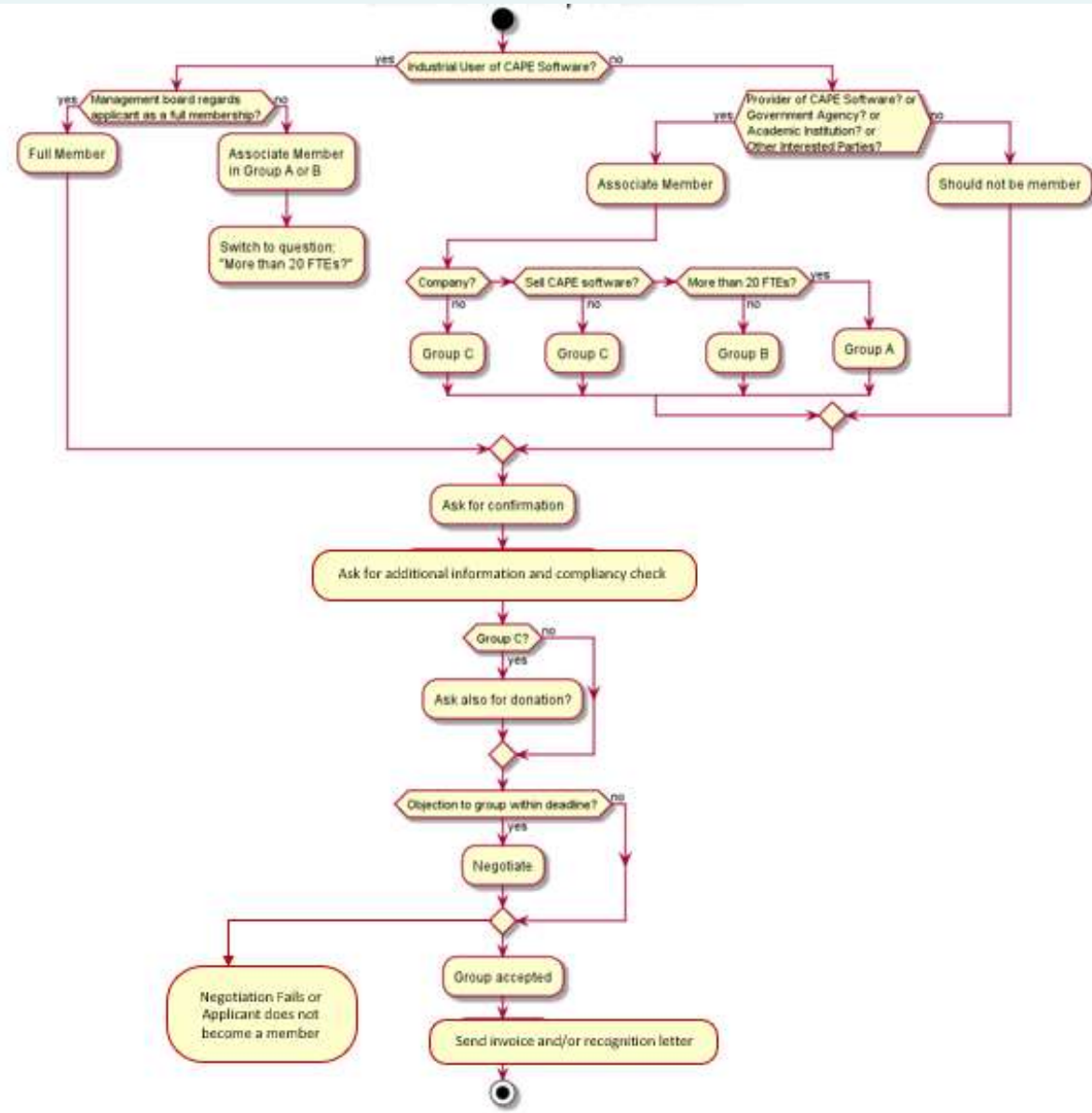
- ❑ Membership approval procedure made fully consistent with EU, UN and US regulations.

PSRE is no longer a member in 2022.

- ❑ Approval / Categorisation of new members by Management Board.



Decision tree enhanced



CO-LaN Funding Model

❑ Scheme outline

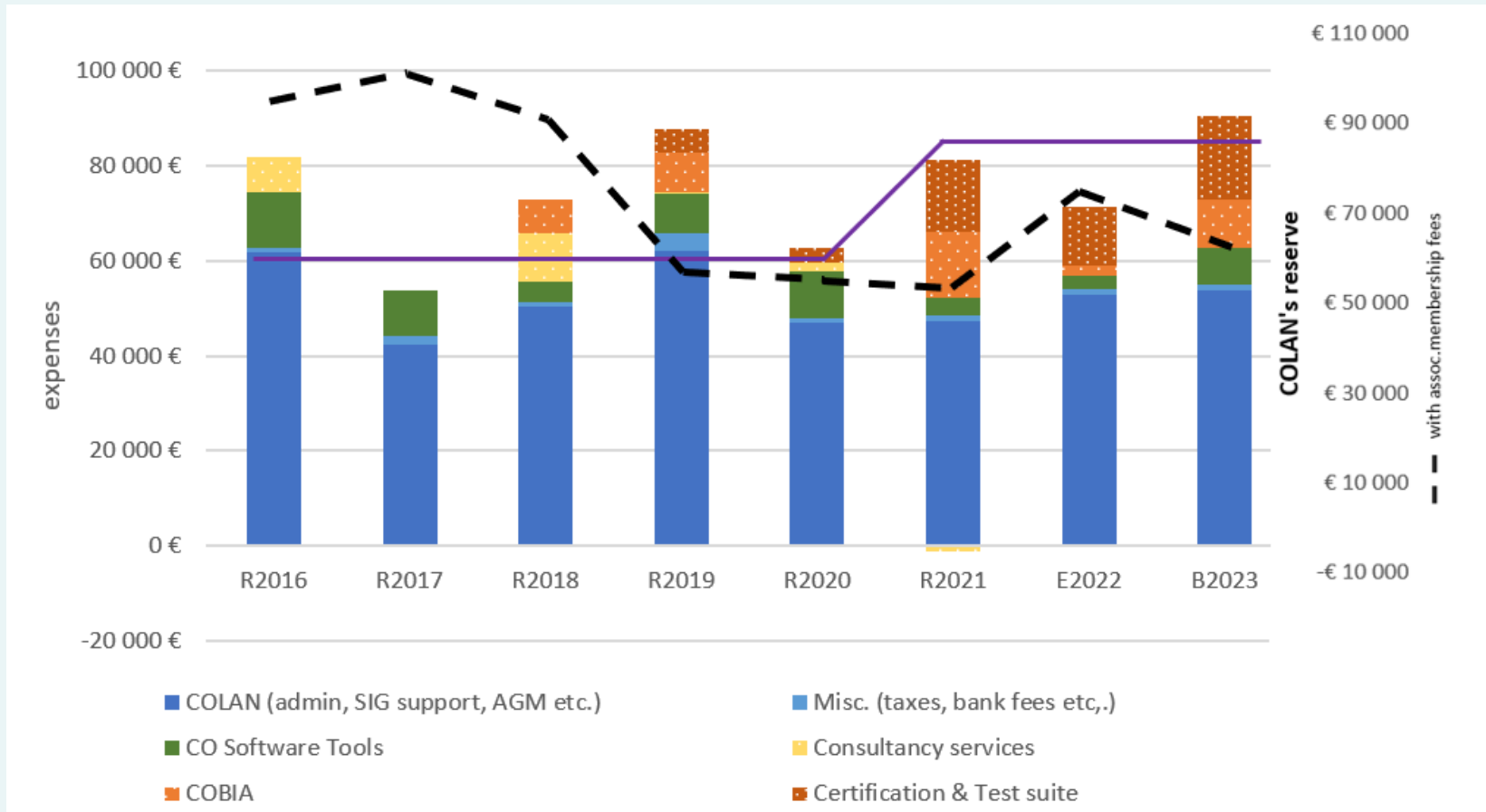
- ⇒ Full Members: 10k Euros/year
- ⇒ Commercial provides of CAPE software
 - Group A (> 20 employees): 2000 Euros/year
 - Group B (\leq 20 employees): 100 Euros/year
- ⇒ Remaining Associate Members are free of charge

❑ Success of new funding model

- ⇒ 11 Corporate Associate Members in Group A
- ⇒ 10 Corporate Associate Members in Group B

❑ No change expected to the scheme till end of 2025

CO-LaN Funding Model



□ 2021 : operated without loss

□ 2022 : payments frozen between March and September

CO-LaN Overview: Management Board

- ❑ **Control & decision making**
- ❑ **Composed only of representatives of Full Members**
- ❑ **Management Board (current)**
 - ⇒ Shell Global Solutions Richard Baur (President)
 - ⇒ Air Liquide Philippe Arpentinier (Treasurer)
 - ⇒ BP Kathryn Yearsley (Secretary)
 - ⇒ BASF Norbert Asprion
 - ⇒ Dow Michael Berger
 - ⇒ Linde Oliver Koch
- ❑ **Monthly conference calls of 1½ h, plus twice yearly physical meetings and additional meetings on specific topics**
 - ⇒ Two physical meetings in 2021-2022, otherwise virtual meetings

CO-LaN Overview

Daily Operations: annual contracts awarded by CO-LaN

- ❑ **Michel Pons Technologie, CTO (retiring January 1, 2023)**
Responsible for day to day operations (till March 31, 2022)
Plus SIG management, software distribution, etc...
- ❑ **Floor&Cie (since April 1, 2022)**
Office manager: invoicing, contract
Management, membership management,
digital communication channels, etc...
- ❑ **MRW Consulting**
Project lead for certification & Test Suite

Using data for 12 months to Septembre 2022

CO-LaN Overview

❑ **Stenhouse Simulations Ltd**
(till May 1, 2022) Secretarial support



Thank you Bryn !

Bryn worked at BP in modelling and simulation activities till his retirement. Within BP, since the mid-90s, he was involved with CAPE-OPEN at various levels.

Since March 2014, Bryn actively supported CO-LaN Management Board and CTO, mainly by carrying administrative tasks.

CO-LaN Overview

Project related contracts awarded for software services delivered to CO-LaN:

❑ AmsterCHEM (Jasper van BATEN)

COBIA Phase II maintenance, COBIA Phase III development, software services, Test Suite design & development

❑ Céondo GmbH (Loïc d'Anterroches, Marcus Bruno Fernandes Silva)

Software services & Test Suite development

These contracts are managed via dedicated work orders.

CAPE-OPEN usage and awareness

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

- ❑ Krone, D., Esche, E., Asprion, N., Skiborowski, M., & Repke, J.-U. (2022). **Enabling optimization of complex distillation configurations in GAMS with CAPE-OPEN thermodynamic models.** *Computers & Chemical Engineering*, 157, 107626.

Linked to MOSAICModelling, a modelling framework featuring CAPE-OPEN functionality such as automatic export of a CAPE-OPEN Unit Operation; described at previous CAPE-OPEN Annual Meetings

- ❑ Picaud-Vannereux, S., Lutin, F., Favre, E., & Roizard, D. (2020). **Energy efficiency of membrane vs hybrid membrane/cryogenic processes for propane recovery from nitrogen purging vents: A simulation study.** *Separation and Purification Technology*, 240.

Linked to MEMSIC, a membrane separation calculation module as a CAPE-OPEN Unit Operation, see CAPE-OPEN 2021 Annual Meeting for numerous demos

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

Please make CO-LaN aware of publications & mention CAPE-OPEN technology when using it.

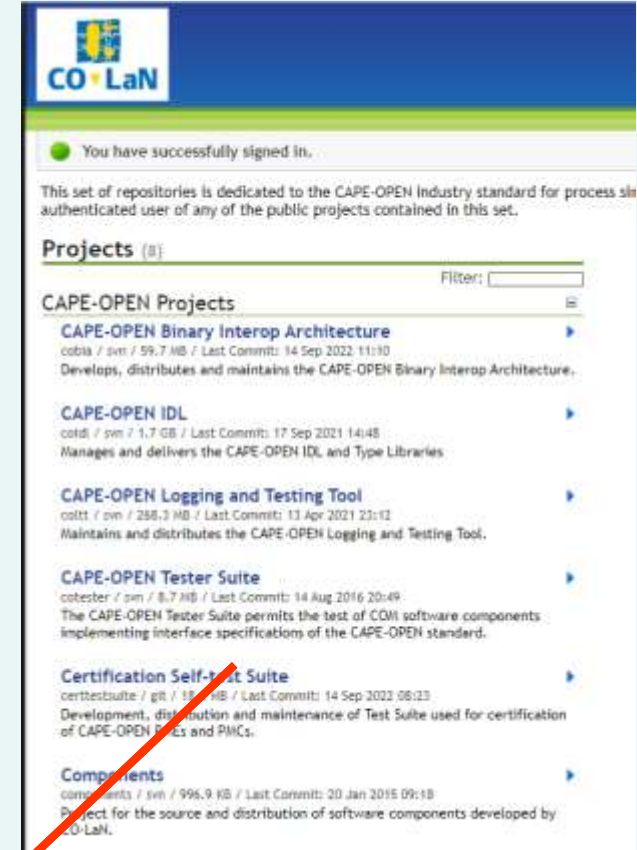
CAPE-OPEN usage and awareness

CO-LaN Repositories

❑ Used for:

- ➔ Managing software development
 - COLTT, COBIA, TLB/PIA, Test Suite
 - Symbol server for COBIA
- ➔ Delivering software and documentation
 - COLTT, TLB/PIA, COBIA distributions
 - Examples, complete specification sets
 - Available free to all
- ➔ Storing working documents of SIGs & MB

❑ Members, check that you have access



CAPE-OPEN usage and awareness

☐ CO-LaN Website

















- ⇒ Moved to another hosting provider in 2021-2022
- ⇒ [Sign up for the CAPE-OPEN Newsletter](#) for news and updates once per month
- ⇒ Over 1620 Posts (~70 in a year)
- ⇒ Subscribe to feed via RSS
- ⇒ Get continuous updates on SIG activities
- ⇒ Check posts/entries about your PMEs and PMCs and contact CTO for updates



☐ CAPE-OPEN Wikipedia

CAPE-OPEN usage and awareness: forum

- ❑ **Objective: to allow CAPE-OPEN experts to answer queries**
 - ⇒ Use of COCO, development of PMCs such as Unit Operations and Property Packages.
 - ⇒ Target audience: end-users of process simulation, developers
 - ⇒ In active use for support queries
 - Number of users: 314, (297-Oct 21, 254-Oct 20). Most users simultaneously online: 69 in July 2022.
 - Number of posts: 2422 (2318-Oct 21, 2137-Oct 20), approx. one post per business day

GENERAL	TOPICS	POSTS	LAST POST
 Howto BEST WISHES FOR 2020!	7	12	by colancto  12 June 2018, 17:20
FORUM	TOPICS	POSTS	LAST POST
 Process Modelling Components Discusses use of CAPE-OPEN compliant Process Modelling Components Moderator: jasper	56	257	by jasper  07 October 2020, 13:05
 Process Modelling Environments Discusses use of CAPE-OPEN compliant Process Modelling Environments	291	1688	by Stephan  21 September 2020, 07:58
 Implementation and development	19	102	by jasper  21 July 2018, 16:40
 CAPE-OPEN interface specifications	5	19	by Rafyl  13 August 2020, 12:54
 Activities of Special Interest Groups Contains discussion threads managed within each Special Interest Group at CO-LaN	24	29	by colancto  12 June 2018, 08:00
 Dissemination actions Discusses opportunities to communicate about use and implementation of CAPE-OPEN interfaces in PHCs and PHEs Moderator: jasper	16	18	by colancto  07 January 2020, 09:35
 News CAPE-OPEN related news	2	9	by jasper  28 September 2017, 07:21

Special Interest Groups (SIGs)

Overview

- ❑ **Responsible for maintenance and development of the 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 (on hold and meeting is planned to decide next steps)
 - Leader: Krishna Murthy Penukonda (AVEVA)
- ❑ **If you wish to participate, please contact CTO**

Summary on Interoperability SIG activities

❑ Activities 2021/2022

- ⇒ Management of CO-LaN Test Suite development
- ⇒ Regular meetings with M&T SIG
- ⇒ Contributions to versioning document

❑ Plans for 2022/2023

- ⇒ Recruit at least one additional member to the SIG
- ⇒ Management of & support to continued development of CO-LaN Test Suite
- ⇒ Release the versioning protocol document

M&T SIG 2021/2022 Summary of Activities

- ❑ **COBIA Maintenance, Development, and Testing**
 - ⇒ One maintenance release of COBIA Phase II
 - ⇒ COBIA Phase III Work Package I Development
 - Generic TCP/IP Marshaler (completed)
 - Optimizing transport for specific marshaling scenarios (initiated)
 - On-the-fly proxy generation (initiated)
- ❑ **Threading in CAPE-OPEN**
- ❑ **Interaction with Interop SIG**
 - ⇒ Support for Certification Testing
 - ⇒ Versioning
- ❑ **Developing Test Specifications for Common Interface Specifications**
 - ⇒ Parameter
 - ⇒ Utilities
 - ⇒ Identification
 - ⇒ Collection

Anticipated 2022/2023 Activities

- ❑ **Maintenance of COBIA Phase II**
- ❑ **Complete Documentation of COBIA Threading Architecture (RFC)**
- ❑ **COBIA III Work Packages**
 - ⇒ Release of COBIA version 1.2.1 with Marshaling and Multi-Threading Support
- ❑ **Develop Test Case Specifications for Common Interfaces**
- ❑ **Interface Specifications**
 - ⇒ CAPE-OPEN Native Persistence Interface Specifications (CAPE-OPEN Version 1.2+)
 - ⇒ Rewrite Parameters Interface Specification document (CAPE-OPEN Version 1.2+)
 - ⇒ Incorporate Errata and Clarifications into Identification Interface Specification (CAPE-OPEN Version 1.1+)
 - ⇒ Finalize Reporting and Managers (CAPE-OPEN Version 1.1+)
- ❑ **Work with Interop SIG**
 - ⇒ Advise on Certification Tools
 - ⇒ Versioning documentation

Summary of Thermo SIG activities 2021-2022

❑ Chemical Reaction Specification document

- ⇒ Revision according to comments received
 - Extensive review from Linde Engineering. Much appreciated.
 - resulted mostly in clarifications brought in the document,
 - few modifications made to interface design.

❑ Specification document for a Manager Common Interface

- ⇒ Requirements and interface design developed
- ⇒ Documentation status: 15 requirements, 8 Use Cases
- ⇒ In the process of finalizing draft

Thermo SIG Outlook 2022-2023

□ Work outlined for this year:

⇒ Support

- Certification support: define the tests (Laborious!)
- Maintain and manage existing interface specifications

⇒ Manager Common Interface proposal

- Hand over to Methods & Tools (M&T) SIG for finalizing
- Suggest Unit Manager to Unit SIG?

⇒ Publish Chemical Reactions interface specification

- Act on RFC, publish IDL, disseminate

Strategic Activities: CAPE-OPEN distribution

❑ CAPE-OPEN Type Libraries / Primary Interop Assemblies

- ⇒ Automated build process
- ⇒ Solution for controlled roll out of TLB/PIA installers in place
 - Extensions to CAPE-OPEN 1.1
 - New versions of CAPE-OPEN

❑ Status 2021-2022

- ⇒ No extension brought to CAPE-OPEN standard v1.1
- ⇒ Latest version 2.1.2 (Sept 23, 2021)

Strategic Activities: CAPE-OPEN middleware – COBIA

❑ COBIA Version 1.2.0.9, March 31, 2022

- ⇒ active maintenance of Phase II deliverables
- ⇒ Downloads : development kit approx. 100 ; run times approx. 200.
- ⇒ COBIA Phase II continues to expand its commercial applications, as will be seen in the OGT presentation.

❑ COBIA threading architecture was reviewed, improved, and a consensus has been reached.

❑ COBIA Phase III : 1st WP out of 4 is 90% completed

2023 should see COBIA 1.2.1 released (marshalling and multi-threading support).

Budget allocated for further development in 2023

Strategic Activities: CAPE-OPEN Certification

- ❑ Only minor updates to Test Suite design were necessary
- ❑ Prototyped test specification documents
- ❑ Assessed workload for test documentation and implementation
- ❑ Started work on thermodynamic Property Package tests
- ❑ Intentions for commercial aspects of certification
 - ⇒ Test Suite free to CO-LaN members
 - ⇒ Certification free for members

Strategic Activities: Ideas for CAPE-OPEN v2.0

❑ Software engineering

CAPE-OPEN in the cloud /multithreading → COBIA 

❑ Ideas future developments of the specifications

⇒ Unit Operations

Equation oriented (dynamic) units / Blackbox modelling support

⇒ Thermodynamics


Chemical reaction / Common Manager 

⇒ Flowsheets

Manipulating flowsheets by add/removing units/streams etc.

Sensitivities/ error propagation

❑ Ideas to support Industry 4.0; manufacturing digitization

Process control domain (OTS) / synergies with DEXPI & CFIHOS 

**Scope of CAPE-OPEN v2.0 needs to be defined and requires commitment from
CAPE community**

Review of Milestones from AGM 2021

✓ Start succession planning for CTO

□ CAPE-OPEN certification

- ⇒ Release 1st version of test-suite (*planned for Q1 2023*)
- ⇒ Progress certification process and policy
- ⇒ Nominate Certification Officer (*subject to actual needs*)

□ COBIA

- ⇒ Finalize work-package 1 (*generic marshaller*) (*90% done*)
- ⇒ Consolidate inter-machine marshalling
- ⇒ Offer language bindings (*choice of languages to be done*)

□ Develop roadmap for CAPE-OPEN v2.0

Topics for 2022-2023

- ❑ **Succession plan for CTO**

- ❑ **CO-LaN Test Suite and CAPE-OPEN certification**
 - ⇒ Release 1st version of Test Suite
 - ⇒ Progress certification process and policy

- ❑ **COBIA**
 - ⇒ Finalize Work Package 1 (generic marshaller)
 - ⇒ Identify needs for language bindings / inter-machine marshalling
 - ⇒ Act on needs expressed

How you can help

- Contribute to the CAPE-OPEN certification process**
- Contribute solutions for CAPE-OPEN self-test suite**
- Evaluate and feedback on COBIA**
- Participate in SIGs**
- Feedback on website and CAPE-OPEN wiki page**
- Promote CAPE-OPEN to your colleagues & customers**

**It is vital that each Member assists CO-LaN in its missions
and contributes to its life**

CAPE OPEN 2021 AWARD

CO-LaN chooses Professor Klaus MÖLLER

“for the **promotion of the CAPE-OPEN standard in academic teaching and research**”.



- ⇒ Professor teaching process simulation at the University of Cape Town.
- ⇒ Research specialises in using novel implementations of open-source simulation tools to develop custom simulations and analyses of industrial and conceptual processes.

CO-LaN values the use of CAPE-OPEN tools in teaching and academic research, since it makes students and researchers aware of what CAPE-OPEN can bring them in terms of tool flexibility.