CAPE-OPEN standards are the widely recognized industry standards through which interoperability is achieved between pieces of software used in process systems engineering. The CAPE-OPEN standards have been first beta-released in mid-1999, then officially released (version 1.0) in March 2002. The CAPE-OPEN standards are increasingly implemented in process modelling environments and process modeling components. The market penetration of the CAPE-OPEN standards is increasing year after year: the most prominent software vendors in the process simulation domain (Aspentech, Invensys SimSci-Esscor, Honeywell, Process Systems Enterprise, ChemStations, ProSim SA, RSI-Simcon, etc…), as well as many niche vendors (Infochem Computer Services, TUV NEL Ltd., Cosmologic GmbH, HTRI, AmsterCHEM, etc…) or academic suppliers of process simulation code, have adopted CAPE-OPEN as their preferred means of interoperating. As described in Figure 1, CAPE-OPEN permits the use of TUWAX code (Tulsa University Paraffin Deposition Projects) in COFE process simulator (AmsterCHEM) with access to MultiFlash advanced thermodynamics (Infochem Computer Services).

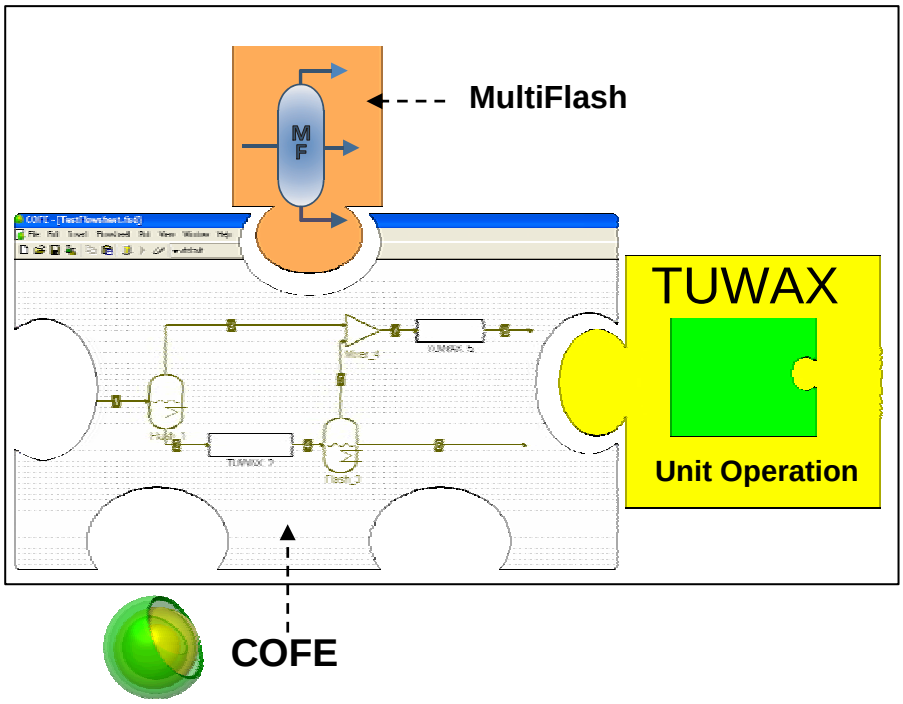

Figure 1: Example of TUWAX code used in COFE with MultiFlash thermodynamics

In the TINA project (R&D project set up by TOTAL and IFP), the feasibility of integrating complex physical models coming from different software providers into a simulation platform has been examined. The CAPE-OPEN standard has been used as the basis of all developments for insuring data and model consistency. As illustrated in Figure 2, the integration of TINA pipe modules and process modules together with a optimizer and Multiflash thermodynamics into INDISS platform has allowed optimization simulations to be performed on a complete deepwater production system.

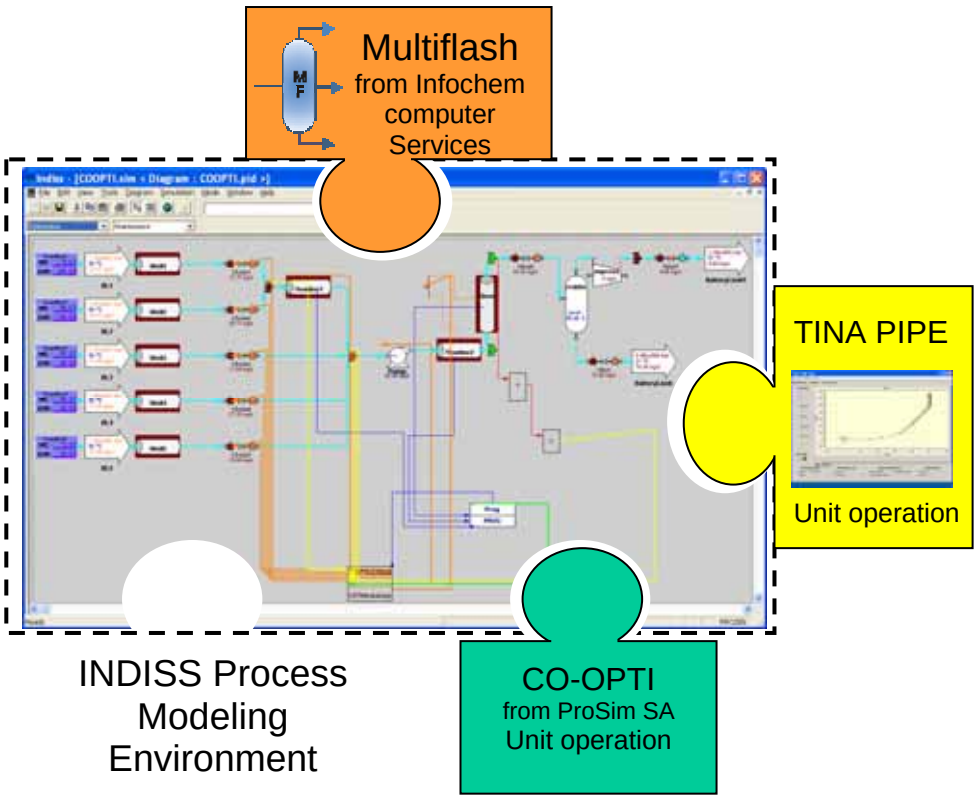

Figure 2: Example of TINA pipes and COOPTI optimizer with MultiFlash thermodynamics into INDISS

The CAPE-OPEN standards are maintained and supported by the CAPE-OPEN Laboratories Network (CO-LaN), a not-for-profit organization strong of 70+ members where half of them are software vendors. The continuous growth of this organization reflects the progress made in the adoption of the CAPE-OPEN standards for enabling interoperability between process modelling environments and process modelling components. The fact that software companies such as SPT Group and COMSOL have recently joined CO-LaN, is showing the current progress. CO-LaN is seeking actively new members.

While the initial CAPE-OPEN standards, as released in 2002, were meant already to cover most of the process simulation domain, CO-LaN has taken recently a number of steps to extend the existing standards and to facilitate their implementation and use.

Advances have been made in the thermodynamic domain with the release of version 1.1 of the Thermodynamic and Physical Properties interface specification (October 2006). A Special Interest Group on Refining Reactors has been created mid-2006 and its first significant results have been presented in March 2007. Further implementations have occurred on the extension to dynamic unit operations of interfaces developed at first only for steady-state unit operations. Guidelines on interoperability between .NET and COM middleware, as related to CAPE-OPEN interface implementation, have been issued.

Software tools supporting the implementation of CAPE-OPEN interfaces have been developed by CO-LaN and distributed to the CO-LaN membership: a new version of the Wizard for Unit Operations in Visual Basic has been released in 2006. The Wizard is now

fully compliant with version 1.0 of the CAPE-OPEN standards. The Wizard simplifies the process of developing a CAPE-OPEN compliant Unit Operation by writing automatically most of the source code necessary. Secondly the production version of the CAPE-OPEN Logging and Testing Tool (COLTT) has been released in March 2007 and maintained since then. COLTT helps making diagnostics on the communication taking place through CAPE-OPEN interfaces between a process modelling component and a process modelling environment.

Training in CAPE-OPEN concepts and implementation has developed through the sponsorship of CO-LaN while specifically targeted dissemination events have been organized in Europe and in the U.S. Three one-day training courses have taken place over the 2006-2007 period, two in the US and the other one in Europe, gathering altogether 40 participants. CAPE-OPEN conferences have been organized on an annual basis both in the US and Europe for the past four years with increasing participation.

For the future, additional areas have been defined where the CAPE-OPEN standards will be extended to serve the end-user community and the software vendor community: hydrodynamic modelling, solid thermodynamic physical properties for instance.

Visit www.colan.org for updated information on activities of the CAPE-OPEN Laboratories Network.