CAPE-OPEN End-User's Perspective

What are companies and CAPE professionals looking for in CO compliant software components?



vww.colan.org

TOTAL at a glance

One of the top four international oil companies

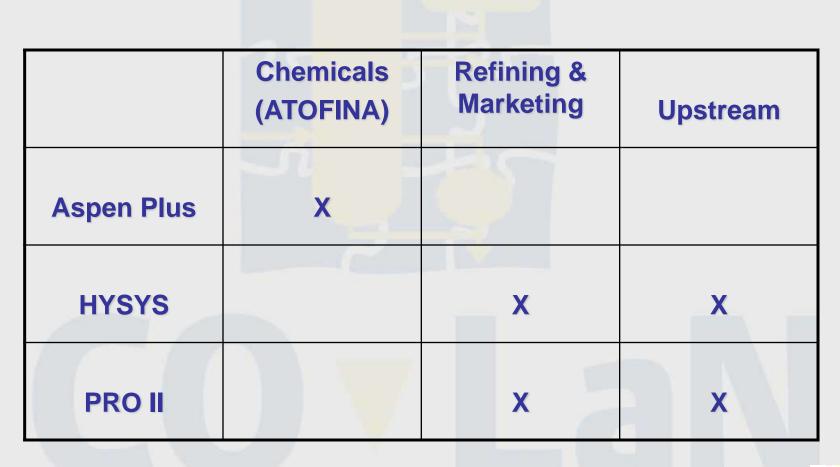
- ⇒ Production: 2,5 million barrels of oil equivalent (boe) per day
- ⇒ Proven reserves at end-2003: 11,400 billion boe
- **Gas and Power, coal and other energies**
 - Interest in five of the world's largest liquefaction plants (40% of world LNG production capacity)
- Europe's front-ranked refiner and marketer
 - Interests in 28 refineries
 - Nearly 16,000 service stations

ATOFINA: world's sixth largest chemicals manufacturer

A European or world leader in each business



TOTAL: several PMEs used





Needs to be adressed

Needs in the Upstream business

- Integrated multiphase flow simulation platform from reservoir to the surface production facilities
 - Easy interoperability with other suppliers

Needs in Refining & Marketing business

Use of identical models in planning/scheduling as well as process simulation activities

Needs of Chemical business

- Advanced models of Unit operations
 - Access to best-of-breed software

www.colan.org

CO La

Inter-business collaboration

- Advanced thermodynamic models well known to chemical branch made available to upstream
- Common absorption column model for all three branches



Background

Three possible types of standards

- ⇒ Formal: none available from ISO
 - Open for use by any compliant supplier or user
 - Modification by wide consensus only
- ⇒ De facto: CAPE-OPEN
 - Technology owned by a supplier or a group
 - Modification made by the owners
- Proprietary: each simulator has its own
 - Technology owned by a supplier
 - Modification by owner only

www.colan.org

8-24/25-04 Cincinnati EPA

CO La

Benefits of standards for manufacturers (ARC)

- Increase market access and acceptance
- Reduce time and costs in product development
- Gain competitive advantage and faster time to market
- Cut costs in component and material acquisition
- Reduce administrative and material expenses
- Lower insurance cost
- Protect against litigation
- Reduce uncertainty in implementation
- Increase productivity in system design and training
- Reduce product variability
- Increase asset availability
- Create higher-level comprehension and awareness



Strategy

TOTAL chose to get involved with standards making A commitment of more than 800 K\$

TOTAL chose to adopt a de facto standard

- Adapted to our industry needs
- Developed in collaboration with end-users, software vendors and academics
 - Learnt from past experience that this mix was necessary
- Quickly available to the market place
 - Development started in 97, draft available in 99, first commercial tools implementing CO in late 99, early 00



Policy enforced

Software development

CAPE-OPEN standard compliance included in the specs

OTC 2002 Deep offshore well metering and permutation testing

Software purchase

- CAPE-OPEN standard compliance included in the requirements to be fulfilled
- Priority given to suppliers implementing CO standard



Targeted parts of CAPE-OPEN standards

Chemicals

- ⇒ UNIT Operations
- ⇒ Thermo Packages
- ⇒ Physical Properties Data Banks
- Refining & Marketing
 - ⇒ UNIT Operations
- Upstream
 - ⇒ UNIT Operations
 - Thermo Packages
 - ⇒ Solvers

CO La

Conclusion

Standards are key to success

CAPE-OPEN is the only de facto standards for simulation

CAPE-OPEN is key to success in TOTAL projects supported by modeling and simulation



www.colan.org

8-24/25-04 Cincinnati EPA

The Dow Drivers

Integration of tools is key to efficient CAPE and lowcost solution development

Alignment with few vendors offers minimum variability (built-in integration)

No single vendor has all the best solutions

Integration to be done in the market, not in-house

CAPE-OPEN standards are Dow's path forward



The Dow Approach

- Company-wide single PME loaded on all CAPE professionals' PCs
- Business specific physical properties added to standard phys props package
- Company-wide standard PMCs for specific Unit Operations – available from software bookshelf
- Requiring all software suppliers to be CO compliant
- Specific groups (R&D, Advanced Modeling) given allowance to work with non-standard packages (from universities, new vendors, etc.)
- New PMCs become standards when proven



Dow CO Value Proposition

Standardization drives lower costs, reduced variability, and consistent solutions

PMCs from equipment suppliers is a real opportunity – not just model a compressor, model the brand and model of compressor to be used in the plant

Standardized equipment and CO compliant software yields low capital cost, low maintenance cost, and high plant efficiency

