

CAPE-OPEN End-User's Perspective

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



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

	Chemicals (ATOFINA)	Refining & Marketing	Upstream
Aspen Plus	X		
HYSYS		X	X
PRO II		X	X

Needs to be addressed

- **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**

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

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

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**

CO  LaN



The Dow Drivers

- Integration of tools is key to efficient CAPE and low-cost 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**

