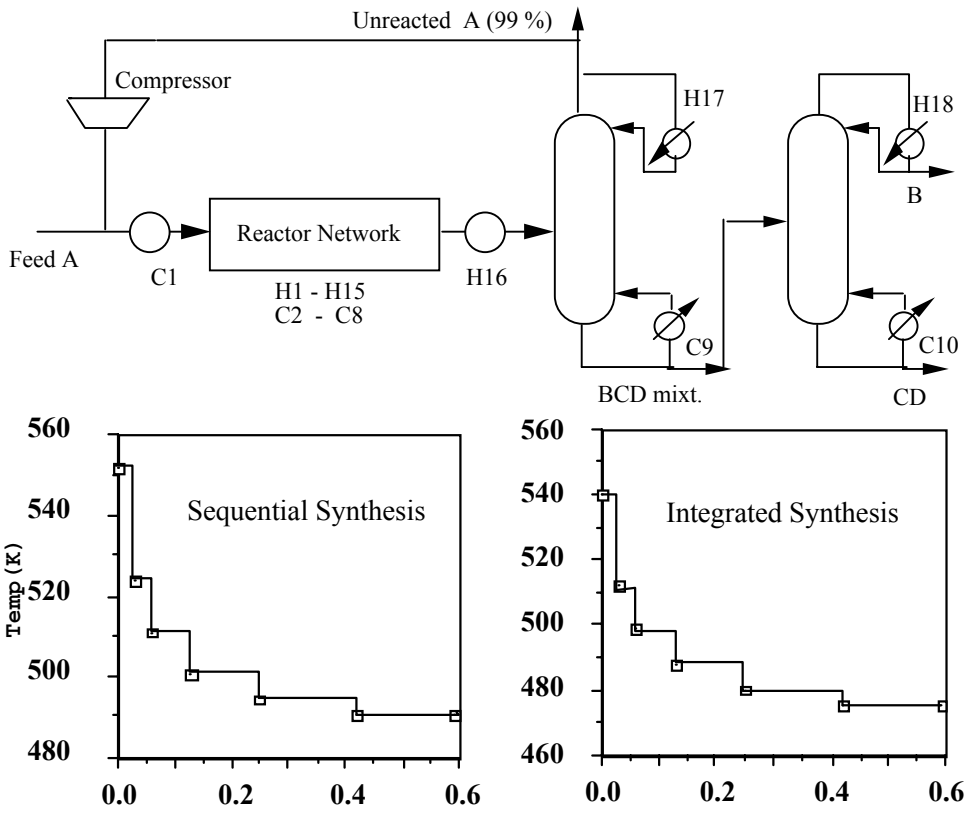


**Figure 8: Integrated Process Design with van de Vusse Kinetics**

design under uncertainty, (Ierapetritou et al., 1996; Pistikopoulos, 1997), design and dynamic performance (Logsdon and Biegler, 1993), design, scheduling and dynamic performance (Bhatia and Biegler, 1996), scheduling and dynamic performance (Mujtaba and Macchietto, 1993), interactions of energy, separation and reactor subsystems (Balakrishna and Biegler, 1996; Duran and Grossmann, 1986), interactions of control and design (Pistikopoulos and Sakizlis, 2001; Luyben and Floudas, 1994; Morari and Perkins, 1994; Walsh and Perkins, 1994), process design and planning (Pinto and Grossmann, 1994; Sahinidis and Grossmann, 1991) and safety, design and performance (Abel et al., 1998). On the other hand, such formulations naturally lead to larger optimization problems that need to be addressed with improved algorithms and decomposition strategies.

To illustrate the benefits of integration in process design, a previously published reactor network case study (Balakrishna and Biegler, 1996) is presented here briefly. This approach incorporates a reactor synthesis strategy by Subash Balakrishna as well as a heat integration formulation initially developed by Duran and Grossmann (1986). The goal is to combine the synthesis of a nonisothermal reactor network, synthesis of the heat exchanger network and optimization of the flowsheet, presented in Figure 8. The reactor network deals with the van de Vusse kinetics:

$$A \rightarrow B \rightarrow C,\ 2A \rightarrow D$$

where A is the reactant, B is the desired product and C and D are unwanted byproducts. With the goal of maximizing overall process profit, we consider two cases. First a *sequential approach* is considered, where an optimal reactor network is synthesized with flowsheet constraints to reflect the process objective function. At this solution, a heat integration is performed and a heat exchanger network is synthesis to reduced the utility requirements. In the second case, an *integrated solution* is found where the reactor network, process flowsheet and heat recovery are determined simultaneously.

The solution for both cases is shown in Table 1. Structurally, the resulting flowsheets are remarkably similar. In both cases a plug flow reactor is found and similar falling temperature profiles for both reactors can be observed in Figure 8. On the other hand, the exploitation of trade-offs in the integrated case can be seen clearly in Table 1. For instance, the integrated process 'knows' that heat recovery leads to reduced energy costs and therefore focuses on a higher selectivity to product B and fewer byproducts C and D. This is despite a lower conversion per pass in the reactor and a higher recycle rate. As a result of the integrated policy and higher overall conversion, the overall profit nearly doubles!

**Table 1: Results of Integrated and Sequential Synthesis Strategies**

| | Sequential | Integrated |
|---|---|---|
| Overall Profit | $38.98 \times 10^5$ \$/yr | $74.02 \times 10^5$ \$/yr |
| Overall Conversion of A to B | 49.6 % | 61.55% |
| Hot utility load | $3.101 \times 10^5$ BTU/hr | $2.801 \times 10^5$ BTU/hr |
| Cold utility load | $252.2 \times 10^6$ BTU/hr | $168.5 \times 10^6$ BTU/hr |
| Fresh Feed A | $8.057 \times 10^4$ lb/hr | $6.466 \times 10^4$ lb/hr |
| Degraded Product C | $3.112 \times 10^4$ lb/hr | $1.44 \times 10^4$ lb/hr |
| By-Product D | $0.933 \times 10^4$ lb/hr | $1.00 \times 10^4$ lb/hr |
| Recycled A | $1.22 \times 10^4$ lb/hr | $1.963 \times 10^4$ lb/hr |

The above cases represent exciting approaches and challenges in PSE, both for academic research and industrial application. In addition, there are many other research activities including the development of global optimization strategies for process synthesis and design (e.g., by Chris Floudas and Nick Sahinidis), applications to design under uncertainty (e.g., by Ignacio Grossmann and Stratos Pistikopoulos) and applications of optimization strategies to molecular dynamics, product design and biotechnology (e.g., by Costas Pantelides, Chris Floudas, Costas Maranas, Luke Achenie, Ignacio Grossmann). These activities point to interesting problems, research challenges and rich opportunities that should keep PSE researchers happy and thriving for quite some time. So this leads me to the final (and seemingly unrelated) point, which was inspired by Erik Ydstie:

***Concept 5:* Why aren't we having more fun?**

To explore this concept, I would like first to borrow from a different field and consider some lessons from Pop Psychology. Surprisingly, there are a number of 'happiness researchers' who have documented what makes us happy or not. In particular, Csikszentmihalyi (1991) has isolated a key element for happiness that he calls 'flow.' Without giving a specific definition, 'flow' can be found when the individual is involved in an activity with the following characteristics:

- There is a *skill/demand match* where the individual is challenged but not overwhelmed.
- The individual is allowed to devote *full attention* to a task.
- There are *clear targets and goals* to focus on.
- A *feedback mechanism* is provided for success.
- The individual has *control* over the activity.

Under these conditions, Csikszentmihalyi observes that when 'flow' is achieved, the concern about one's surroundings disappears and that the passage of time is perceived differently. Despite the elusive definition of 'flow,' we as PSE researchers, have all experienced these feelings at some point in our work, especially if we have the resources required, helpful colleagues and an interested audience. Moreover, we are especially fortunate that the nature of engineering and, especially PSE, deals with math and science that has a purpose. In PSE we solve real world problems that originate from nature for mankind's benefit and we are often fortunate to see tangible results when our creations work.

On the other hand, it is important to note that others who are not PSE researchers do not have these benefits. In fact, many professionals including lawyers, managers, administrators, and even psychologists derive their success and 'feelings of flow' by developing man-made systems for us to follow. As a result, in addition to 'feelings of flow' derived from our research, we also derive the opposite feelings as we are forced to satisfy these man-made systems, which I will call, for lack of a better term, *Basic Services*. So one of the goals to increase our level of happiness is to allocate more resources for research and less to *basic services*. How do we do this?

One approach espoused by Covey (1990) is illustrated in Figure 9a and follows a classification of our personal tasks into four categories. The goal is then to move from Figure 9a to 9b by recognizing that important and urgent tasks will always persist, but important, non-urgent tasks require a priority. This requires us to minimize our involvement in tasks that are not important, even if they are urgent (to someone else). Many of us would put *basic services* in the last category; avoiding them requires us to 'Just Say No.'

While such an approach has its benefits, the long-term consequences can be disastrous. These can be seen in any Dilbert comic strip (Adams, 1996) and are captured by the *Dilbert Principle of administration:* by avoiding basic service tasks, one loses control over them - to someone with interests not to your benefit. To combat this, we need an alternative to Covey's approach and for this we need to turn away from popular psychology. In addition to popular science and popular mechanics, why not consider popular optimization, or *Poptimization?*

| | |
|---|---|
| Urgent and Important | Important Not Urgent |
| Neither important nor urgent | Not Important Urgent |

| | |
|---|---|
| Urgent and Important | Important Not Urgent |
| Neither important nor urgent | Not Important Urgent |

**Figure 9: Allocation of personal tasks: before (a) and after (b)**

In his excellent CAST award presentation last year, Jim Rawlings declined the opportunity to present a few theorems on his work. To make up for this, I thought I would present an analysis of a Poptimization Problem related to the above dilemma. In the literature, there are a number of standard named optimization problems including the knapsack problem, the transportation problem and the assignment problem. Here I would like to introduce the *Basic Services Problem.*

Let the index i be in set I, where I = {us} and define the nonnegative variables $s_i$ to represent the amount of non-academic (i.e., basic) services assigned to us. Here BS is the total amount of basic services. The resources consumed to perform these basic services are assumed to follow a power law: $\alpha_i s_i^{\beta}$ where $\alpha_i$ and $\beta$ are positive coefficients. Minimizing the resources expended on basic services leads to the following Poptimization Problem:

$$\text{Min} \sum \alpha_i s_i^{\beta}$$

$$\text{s.t.} \sum s_i = BS,\ s_i \geq 0$$

The first order Karush Kuhn Tucker (KKT) conditions for this problem are given by:

$$\alpha_i \beta s_i^{\beta-1} - \gamma = \eta_i \geq 0.$$

For the solution of this problem we consider two cases, represented in Figure 10. As engineers, we are probably most familiar with the Efficient Case where $\beta \leq 1$. This translates into the familiar economy of scale where the resources expended increase less quickly with increasing service requirements. For this case we have the solution:

$$s_k = BS \text{ where } k = \text{argmin}_i (\alpha_i)$$
$$s_i = 0 \text{ otherwise}$$

Proof: for any feasible $s_i$, $i \in I$, we have for $\beta \leq 1$,

$$\sum (s_i/BS)^{\beta} \geq 1 \Longrightarrow \sum (s_i)^{\beta} \geq BS^{\beta}$$

Substituting this relation into the objective function reveals that for any feasible $s_i$,

$$\sum \alpha_i s_i^{\beta} = \sum (\alpha_i - \alpha_k) s_i^{\beta} + \alpha_k \sum s_i^{\beta} \geq \alpha_k \sum s_i^{\beta} \geq \alpha_k BS^{\beta}$$

In this case, the most efficient person to perform the basic services gets all of the BS. QED

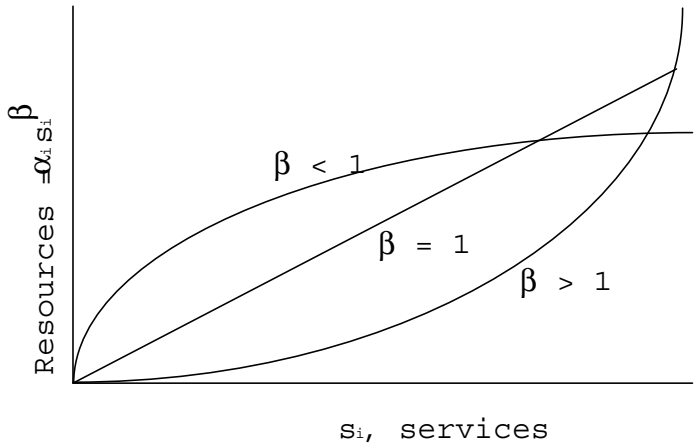


**Figure 10: Cases for the Basic Services Problem**

The second case, the Inefficient Case where $\beta > 1$, appears to be counterintuitive and perhaps unnatural to most engineers. However, we only need to consider some mundane examples (e.g., converting to a new accounting system or process simulator, converting to Windows 2000, dealing with an incompetent administrator or a committee)

to see that it is often realistic. Dilbert scenarios are especially good examples of this case. For this problem we have the following solution:

$$s_i^* \propto (\alpha_i\ \beta)^{1/1-\beta},\ \sum s_i^* = BS$$

Proof: Assume from the KKT conditions that :

$$\alpha_i\ \beta\ s_i^{\beta-1} - \gamma = \eta_i = 0$$

which leads to

$$s_i^* = (\gamma/(\alpha_i\ \beta))^{1/\beta-1} > 0$$

$$\sum s_i^* = BS$$

and the first order KKT conditions are satisfied. Also, from the Hessian of the Lagrange function we have:

$$\alpha_i\ \beta\ (\beta - 1)\ s_i^{\beta-2} \geq 0$$

which shows this case to be a convex problem with $s_i^*$ as the global minimum. As a result, the optimal solution for this case is to distribute the BS within set I, according to each person's abilities to handle it. QED

The result of the second case is interesting, as it invokes the purpose of administration's goal as a service to academic teaching and research - and not as an entity for its own sake. It also requires a "Cincinnatus approach" to administration with a rotation among academics among these positions, in order to own this process. Such an approach was common in the US, but has largely disappeared with the explosive growth of university bureaucracies. On the other hand, it still thrives in Europe, where academic administrators (department chair, dean, etc.) play a service role to facilitate the growth of research - and not stand in its way.

**PSE Research: the way onward**

To close, I would like to sum up with the optimization concepts presented above. It is important to note that these concepts have a much broader scope than PSE research itself. In particular, the above concepts require a spirit of communication and collaboration in the research community and a recognition that the distribution of resources for *research is not a zero sum game*. Instead, why shouldn't we benefit from the following activities:

- *work together* in a coordinated manner for more efficient operation
- *respect diversity,* especially in the talents and backgrounds of our colleagues
- *sweat the details* - this is the key to owning our research!
- *integrate tasks and focus on an overall goal* to advance in a synergistic manner
- *deal with the Dilbert Principle of administration* by distributing responsibilities - in order to own the process and have fun!

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**Quote of the Day** - Medical physicist Rosalyn Sussman Yalow was only the second woman to receive the Nobel Prize in Medicine. On receiving her Prize, Dr. Yalow spoke encouragingly to women in science:

**--- We must believe in ourselves or no one else will believe in us... We must feel a personal responsibility to ease the path for those who come after us. The world cannot afford the loss of the talents of half its people if we are to solve the many problems that beset us**. ---

# CAST Policy on Technical Paper Reviews and Acceptance

**CAST Programming Board**
Mike Malone, Chair
Larry Biegler, Vice-Chair

CAST will sponsor and co-sponsor numerous sessions at the 2001 AIChE Annual Meeting. Please see www.aiche.org/annual and links thereon for session information and to submit proposals to present. Note the meeting deadlines at www.aiche.org/Annualapp/info/meetsched.asp and the guidelines at www.aiche.org/conferences/guidelines. Extra information on the CAST related AIChE meetings are listed at www.castdiv.org/MeetingsandConferences.htm.

Also, note the following policy on reviews and multiple paper submissions. At the 2000 Annual Meeting in Los Angeles, the CAST Executive Committee instructed the Programming Board to formulate and implement a policy on multiple paper submissions for the AIChE Annual Meeting Program. The Programming Board has adopted the following policy for 2001.

## Policy on Technical Paper Reviews and Acceptance

1. Proposals to submit papers for presentation at the AIChE Annual meeting receive anonymous peer review, as well as review by session Chair and Co-Chair. Exceptions are for invited papers in the CAST Plenary session, and for papers in sessions sponsored jointly by CAST with other areas that do not have a review process. Acceptance and rejection of papers in sessions not covered by this policy are the responsibility of the session chair and co-chair.

2. Details for implementation of the review process are decided by the Area Programming Chairs in consultation with CAST members attending the area programming meeting at the Annual Meeting, and/or those CAST members providing written suggestions to the CAST Programming Board before the Annual Meeting.

3. Unless individual areas decide other procedures, CAST suggests the following review process. Area Program Chairs shall publish other approved policies via the CAST e-mail list once each year, at or near the time that the AIChE opens the PTP submission process.

a. The session chair, session co-chair, and one other qualified person decided by the Area Program Chair shall review each submission. The third reviewer shall be anonymous, and will normally be selected from among chairs and co-chairs of other sessions at the meeting and/or from the CAST Programming Board membership.

b. The contents of all proposals to present is privileged and shall be confidential until and unless the material is presented at the Annual Meeting. Reviewers and programmers shall protect the confidentiality of such information as they would protect their own such information.

c. No person shall review their own submission or the submission of a collaborator or colleague where there is a conflict of interest. Reviewers shall point out such conflicts when a review is requested, and session chairs and co-chairs shall request additional or alternate anonymous reviews from the Area Chair as needed. Area Chairs shall request that reviewers of their own papers or those where there is a conflict of interest be assigned reviewers by one or the other of the remaining two area chairs. The Group Programming Chair or Vice-Chair shall be consulted if necessary to obtain further reviewers.

d. The session chair and co-chair, in consultation with the area chair if necessary, shall decide on acceptance or rejection of papers based on the reviews and on the suitability of the subject matter for the session.

e. Every effort should be made to insure a reasonable balance of viewpoints in selecting papers for presentation. Accordingly, the number of presentations per person should be limited to a reasonable number in accordance with AIChE policy (See below). Specifically, CAST suggests that no person should speak more than once at the meeting, unless this prevents the presentation of high-quality papers due to financial constraints, illness of another speaker, or other unforeseen circumstance such as travel delays. Special consideration will be given to foreign authors with large travel costs and speakers in their early careers. Presentation in the CAST Plenary session, poster presentations, software demonstrations, award lectures, and papers with undergraduates at the student paper competition, are specifically excluded from the limit. Otherwise, on no account should a person speak more than four times at the Annual Meeting.

f. No effort will be made to resolve timing conflicts for speakers with more than four papers.

g. Reviewers are requested to take special note of the number of submissions proposed by an author for the current meeting, and of papers presented at previous meetings when evaluating proposals to present. For this purpose, CAST shall request that AIChE provide an archive of recent meeting programs, and an index of

proposals submitted for the current meeting shall also be requested for review purposes. Individuals with session, area, and group programming responsibilities shall also use this information for the purpose of limiting the number of presentations; see item 3e.

h. The CAST Programming Chair and/or Vice-Chair shall resolve conflicts in exceptional cases or where one or more of the responsible parties is unavailable in a timely fashion.

i. On request, authors of rejected papers shall receive anonymous, written copies of reviews.

**AIChE Policy on Multiple Submissions**

The AIChE Executive Board of the National Programming Committee adopted this policy in 1993.

1. No person may author or co-author more than four (4) contributions at any one AIChE Meeting, and
2. No person may author or co-author more than one (1) contribution at any one session.



## New Forum for Computational Molecular Science and Engineering

AIChE recently announced the formation of the Computational Molecular Science and Engineering Forum (CoMSEF). This technical forum will bring together those who are working with molecular modeling and simulation and help educate others to potential uses. Members include engineers and scientists who develop and use molecularly based theories, modeling, and simulation in the chemical, biological, and material fields. Not only will the forum be centered on computation, but also it will be linked to experimental and industrial applications

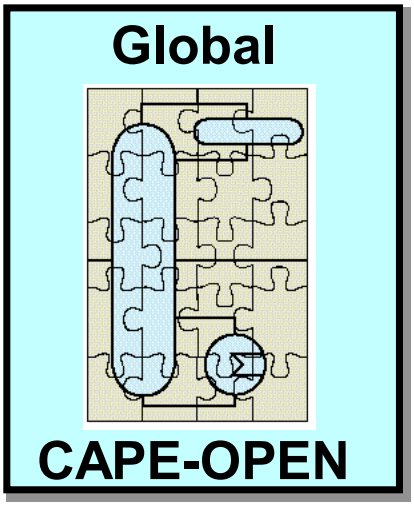
CAST members interested in more information on CoMSEF should contact golabjt@bp.com or go to www.comsef.aiche.org. (*AIChE Extra,* March 2001)

Please look at
www.castdiv.org for
up-to-date information on CAST.

# Global CAPE-OPEN

## Delivering the power of component software and open standard interfaces in Computer-Aided Process Engineering

Kerry Irons, The Dow Chemical Co., and
Bertrand Braunschweig, Institut Francais du Petrole




## Summary

Chemical manufacturers typically employ a collection of software (in-house, commercial, and/or academic) to solve various CAPE-related problems. Before solving such problems, it should be possible for the process engineer to 'assemble' the necessary computational tools with the minimum effort. The objective of the Global CAPE-OPEN (GCO, www.global-cape-open.org) project is ***to deliver the power of component software and open standard interfaces in computer-aided process engineering***. The CAPE-OPEN project established a set of standards (www.global-cape-open.org/CAPE-OPEN_standard.html) to allow communication between various pieces of software from different sources (software and equipment vendors, universities, and company generated). GCO uses CO results and capitalizes on further opportunities that can be gained from open standard interfaces for process simulation.

GCO addresses and answers the following questions:

- How will open process simulation technology be integrated into the process engineering work process?
- How can industry take better advantage of open architectures and standards?
- What are the other open standard interfaces needed for CAPE?
- How is CAPE-OPEN compliant software to be developed?
- How will CAPE-OPEN compliant components be certified and labeled as such?

A consortium representing a wide range of users, researchers and vendors from three continents is answering these questions by developing what can be considered as the second stage of the CAPE-OPEN initiative.

This will provide the process industries with faster, cheaper, more accurate process simulation leading to enhanced competitive and environmental performance. A large new market will be created for specialist simulation vendors, increasing competition and advancing the state-of-the-art.

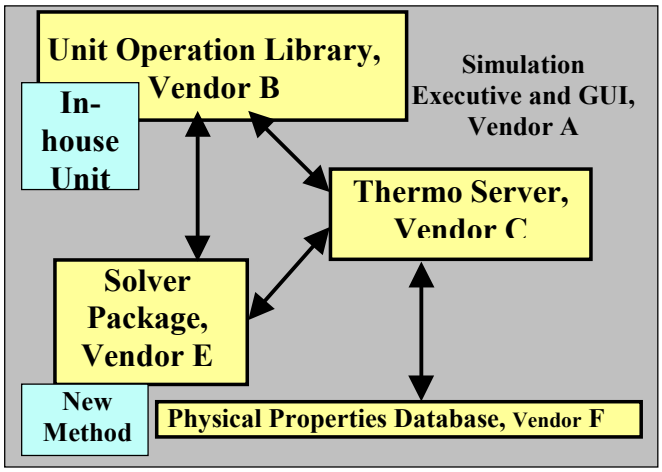
The GCO project will:

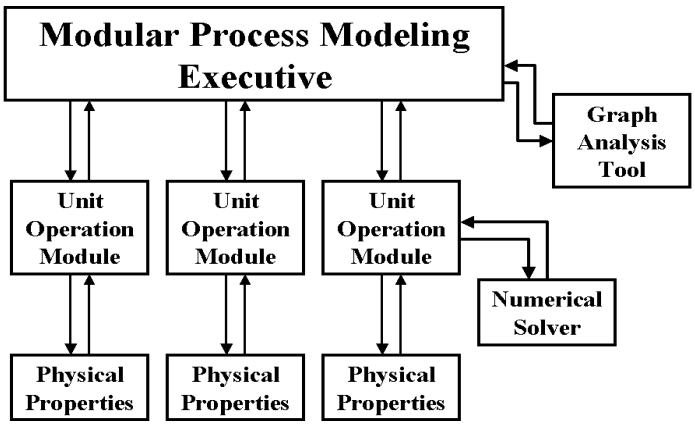
- Develop additional open standard interfaces for CAPE components
- Adapt existing software so that it complies with the CO standard
- Develop methods, training and support tools for helping users to take advantage of the availability of CO-compliant components.

In the course of the project, the consortium will launch «CO-LaN», ***the CAPE-OPEN Laboratories Network***, which will be ***open to other organizations worldwide***, and will manage all aspects of the CAPE-OPEN standards and certification on a long-term basis

## Background

Chemical manufacturers typically employ a collection of software (in-house, commercial, and/or academic) to solve various CAPE-related problems. Before solving such problems, it should be possible for the process engineer to 'assemble' the necessary computational tools with the minimum effort. The CAPE-OPEN project established a set of standards (www.global-cape-open.org/CAPE-OPEN_standard.html) to allow communication between various pieces of software from different sources (software and equipment vendors, universities, and company generated). Much work is needed; however, to develop and establish CAPE-OPEN compliant software and the GCO project (www.global-cape-open.org) is the vehicle for accomplishing that goal.




GCO will coordinate with related efforts such as:

- **The pdXi project** - sponsored by the American Institute of Chemical Engineers (AIChE): www.marchland.com/piebase/project/pdxi.htm
- **The OPC Foundation** - a non-profit organization promoting the use of OLE/COM interfaces for process control (based on Microsoft's OLE/COM middleware, www.opcfoundation.org).
- **The Open-Spirit project** - promoting an open environment for functional exchange by oil companies involved in the upstream business (www.openspirit.com).

As universities, equipment suppliers, and operating companies (to a lesser extent) will continue to develop in-house software, a CAPE-OPEN Laboratory Network (CO-LaN) will be established to assist with migration of such software to the CAPE-OPEN standard. The objective of CO-LaN will be to verify that the migrated software will meet the CAPE-OPEN standard and needed functionality.

An important point to note is that with the exception of the Business Objects and Enterprise Modeling project, most of the current projects on open systems deal with tools for a specific application area. GCO will bring together expertise from different regions of the world to develop open standards that will meet the requirements of chemical manufacturers from around the world.

## Project Objectives

CAPE tools are essential for allowing products and processes into the market quickly. But despite this importance, current commercial simulators often are not capable of simulating leading-edge processes. The market for process simulation has been a market of incompatible proprietary products for years. This situation has a number of significant deficiencies:

- hard to include company specific modeling and process knowledge
- delays of up to a year in incorporating essential elements in the simulation
- necessity to purchase more than one simulator, with additional licence fees, training and error prone data transfer
- difficulty for research institutes and specialist companies to contribute their state-of-the-art expertise
- difficulty in integrating niche products from samll and mid-size enterprises (SMEs)

The need is for a standard open interface which allows the seamless integration of CAPE modules from various suppliers, and which encourages innovation by providing means to quickly integrate new ideas. This need is now obvious to everyone in the CAPE arena: users, vendors, specialists suppliers, and research institutions.

The specific GCO aims are:

- to reduce capital expenditure in the Process Industries, by over 1B Euros per year
- to reduce operating cost across the Process Industries, by more than 800M Euros per year
- to reduce software maintenance and training costs
- to reduce the time taken to launch new products and processes, by up to 50%
- to develop a new market for the suppliers of innovative simulation components

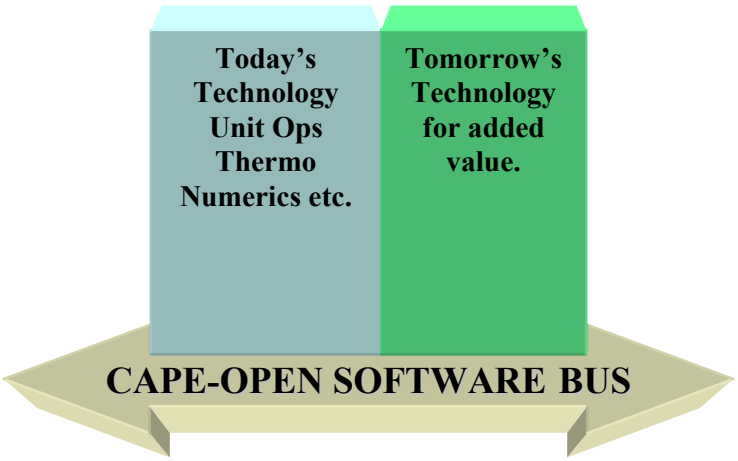
## Expected Major Results

The major expected result of GCO will be the global acceptance of CAPE-OPEN as a standard for communication between simulation software components in process engineering. This will lead to the availability of software components offered by leading vendors, research institutes, and specialized suppliers which will enable the process industries to reach new quality and productivity levels in designing and operating their plants. This will open new markets for suppliers of CAPE components. This is a major breakthrough as compared to the current state-of-the-art, which is that of no integration at all.

The specific results of the GCO will be:

- New Open Interface Specifications in domains and application areas beyond those of CAPE-OPEN.
- Sets of compliant software components developed by the vendors, operating companies and academics involved in GCO.
- Guidelines on how to integrate software components in the simulation environment, including selection criteria, quality assurance measures, and training programs for process engineers.
- Software prototypes of additional components which take advantage of the standard interfaces for providing added value.
- Experience in downloading process engineering software components through I-Nets, allowing a new framework for collaborative work in CAPE.
- A CAPE-OPEN Laboratories Network, aimed at managing the CO standard by providing guidance to developers, conducting compliance tests, and in charge of giving the CO Compiant label to submitted components. After the GCO project, the CO-LaN will live on its own through international funding from compliance labeling, operating companies, software vendors, etc.
- Information dissemination via a web site, brochures and leaflets, conference proceedings, white papers.

The project develops and uses standards that need a worldwide acceptance, and therefore, contributions from four major industrial regions (EU, USA, Canada, and Japan) are included.




## Project Overview and Approach

GCO will:

- Support research on the integration of open process simulation technology in the work process;
- Develop technologies that cannot be done effectively with traditional CAPE systems and are made possible by open architectures and standards;
- Develop standards in new subfields of process simulation as the initial CO project only addressed physical properties, unit operations and numerical algorithms;
- Support development of versions of simulation software conforming to the standard;
- Further disseminate the technical results of CO;
- Give birth to an international standards body and integration laboratories network on process simulation.

GCO will directly address the following objectives: total product life-cycle issues, strategy/planning/design, and virtual/extended enterprise issues:

The CO standards need to be at the interregional level in order to be fully accepted by the industry. The set of partners in GCO gathers an unprecedented setting of highly skilled users, developers and researchers in CAPE. The partners represent 50% of the world users of CAPE software, 90% of the suppliers, and 10 amongst the top 12 research laboratories on the subject. The mix of users gives a broad scope: specialty and bulk chemical manufacturers, continuous and batch process operators, and petrochemical and refining processors.

## GCO Consortium Partners

| Partner | Role |
|---|---|
| Air Products | Industrial (chemical) |
| ASPENTECH | Vendor |
| BASF | Industrial (chemical) |
| BP-Amoco | Industrial (oil & petro.) |
| Carnegie-Mellon University | Academic |
| DECHEMA (Germany) | Vendor |
| Denmark Technical University (DTU) | Academic |
| Dow Chemical Co. | Industrial (chemical) |
| TotalFinaElf | Industrial (chem & oil) |
| Honeywell Hi-Spec Solutions | Vendor |
| HYPROTECH | Vendor |
| ICI | Industrial (chemical) |
| IFP (French Petroleum Institute) | Industrial (oil) |
| Imperial College | Academic |
| Institut National Polytechnique Toulouse (INP) | Academic |
| JGC (Japan) | Industrial (chemical) |
| Kyoto University | Academic |
| Massachusetts Institute of Technology (MIT) | Academic |
| Mitsubishi Chemical | Industrial (chemical) |
| NORSK HYDRO | Industrial (chem & oil) |
| Norwegian University of Sci. and Tech. (NTNU) | Academic |
| Protesoft Corporation | pdXi standards |
| Rheinland Tech. Univ (RWTH) | Academic |
| SIMSCI | Vendor |
| Tokyo Institute of Technology | Academic |
| Universitat Politecnica Catalunya (UPC) | Academic |
| University of Massachusetts | Academic |
| University of Virginia | Academic |
| UOP | Industrial (chemical) |

## GCO Milestones

| Milestone date | Main deliverables |
|---|---|
| December 1999 | Master plan for CO-LaN, Methods and Tools recommendations, approval process, analysis of operating companies' work process, several CO plugs for existing software |
| October 2000 | EC midterm report, case studies, many specification drafts, CO compliant components, Hyprotech and AspenTech CAPE-OPEN Simulation Environment (COSE) sockets |
| July 2001 | European CO-LaN is operational, wrappers for commercial software, other prototypes and specifications, migration tools and cookbook, second year report |
| December 2001 | All deliverables, Project Reports |

For more information, see www.global-cape-open.org or contact:

- Kerry Irons, The Dow Chemical Co., 517-638-7918, -9716 (FAX), ironsk@dow.com
- Bertrand Braunschweig, Institut Francais du Petrole, 33-147-526648, -7022 (FAX), bertrand.braunschweig@ifp.fr

Milestones have been established at months 6, 15, and 24, plus one at the conclusion of the project. Each milestone assessment will be based on the following deliverables, which are identified as quantitative measures of the progress:

**--- Another fun fact.** A total of 168 million Americans are now online - 41 million connecting from work, and 162 million connecting from home (35 million connect from both). [Reuters, 14 Feb 2001]

# COMMUNICATIONS

## How to Contact the AIChE

**One-stop shopping for conferences, publications, membership, divisions, employment, training, government relations, student engineers, and other AIChE products and services may be obtained from the:**

AIChE Customer Service
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Tel. International: (212) 591-8100
Fax: (212) 591-8897
E-mail: xpress@aiche.org
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## CAST10 E-Mail List

Ray Adomaitis, University of Maryland, is the moderator for the CAST10 mailing list. The following items are used to participate in the list:

1) To post messages to the list, please send mail to: cast10@ench.umd.edu
2) Subscribe/unsubscribe messages should be mailed to: emailman@ench.umd.edu
3) Archived messages as of 1 Sep. 2000 can be found at: www.ench.umd.edu/cast10
4) Specific instructions on (un)subscribing and posting messages are located at: www.ench.umd.edu/cast10/subscribe.html

Please note that you can use a short list of keywords to specify where you would like to have your message archived. To use this function, include as the first line of your message:

**Keywords: software, jobs, education, meetings**
using any or all of the keywords.

Ray would like to invite comments on the operation of the e-mail list and archive website, especially suggestions of useful services that can be provided through this list. Send them to adomaiti@Glue.umd.edu.

# MEETINGS, CONFERENCES, CONGRESSES, AND WORKSHOPS

## Location of Meeting Section

To remain as up-to-date as possible, this meeting section is on-line at www.castdiv.org/MeetingsandConferences.htm. As announcements are posted on the CAST10 e-mail list, summaries will be added to the website. Other sources of meeting information will be used as well; a direct e-mail to the Editors will ensure that your favorite CAST-related meeting is listed.

If you do not have access to a web browser, contact the Associate Editor, Karl Schnelle, for a current copy.

**www.castdiv.org/MeetingsandConferences.htm**

## 2001 Executive Committee
(cont'd from page 2)

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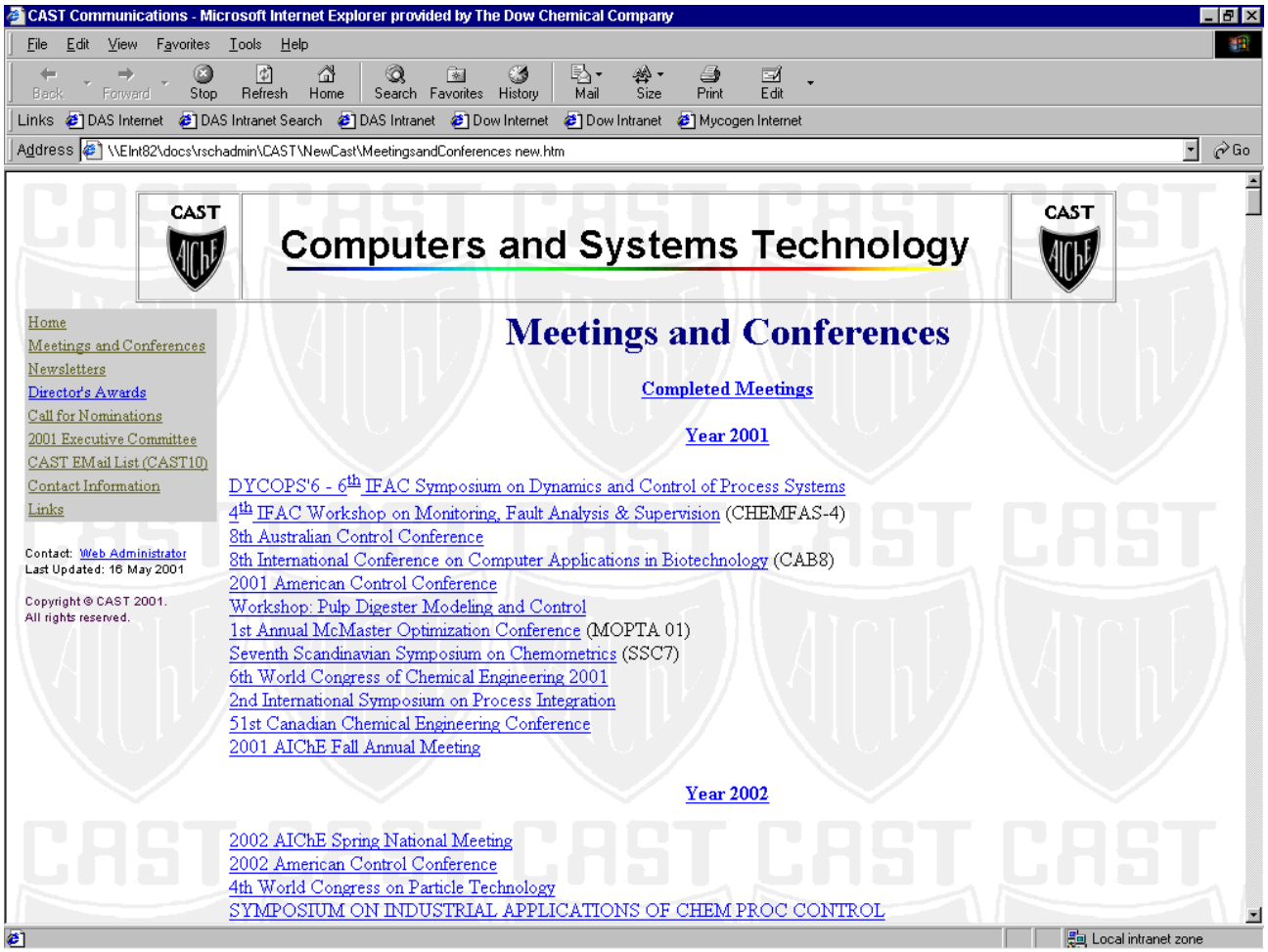

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Already a member? Please ask a colleague to join.

The Computing and Systems Technology (CAST) Division of AIChE is responsible for the wide range of activities within AIChE that involve the application of computers and mathematics to chemical engineering problems including process design, process control, operations, and applied mathematics. We arrange technical sessions at AIChE Meetings, organize special conferences, and publish this newsletter - *CAST Communications* - twice a year. These activities enable our members to keep abreast of the rapidly changing fields of computing and system technology. The cost is $10 per year, and includes a subscription to this newsletter. Shouldn't you join the CAST Division now? See www.castdiv.org for more details.

**Application for Membership**
To join the CAST Division, please refer to contact information below. You may also download and print a PDF registration application from AIChE at www.aiche.org/resources/pdflibrary/member.htm. The form is called "Join a Division or Forum -- 2001 Membership Application".

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Fax: 212-591-8888
xpress@aiche.org

# American Institute of Chemical Engineers

## 2002 Award Nomination Form*

## A. Background Data

1. Name of the Award _____ Today's Date _____
2. Name of Nominee _____ Date of Birth_____
3. Present Position (exact title)

_____

4. Education

| Institution | Degree Received | Year Received | Field |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

5. Positions Held

| Company or Institution | Position or Title | Dates |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

6. Academic and Professional Honors (include awards, memberships in honorary societies and fraternities, prizes) and date the honor was received. Use separate page.
7. Technical and Professional Society Memberships and Offices. Use separate page.
8. Sponsor's Name and Address

_____

_____

_____

Sponsor's Signature

_____

*A person may be nominated for only one award in a given year.

***THE DEADLINE FOR AWARD NOMINATIONS IS April 15, 2002.***

## B. Citation

1. A brief statement, not to exceed 250 words, of why the candidate should receive this award. (Use separate sheet of paper, please.)
2. Proposed citation (not more than 25 carefully edited words that reflect specific accomplishments).

## C. Qualifications

Each award has a different set of qualifications. These are described in the awards brochure. After reading them, please fill in the following information about the nominee where appropriate. Use a separate sheet for each item if necessary.

1. Selected Bibliography (include books, patents, and major papers published).
2. Specific identification and evaluation of the accomplishments on which the nomination is based.
3. If the nominee has previously received any award from AIChE or one of its Division, an explicit statement of new accomplishments or work over and above those cited for the earlier award(s).
4. Other pertinent information.

## D. Supporting Letters and Documents

List of no more than five individuals whose letters are attached.

| | **Name** | **Affiliation** |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |

**Please send the completed form and supplement sheets to the CAST Division 2nd Vice Chair: Prof. Mark A. Stadtherr, Department of Chemical Engineering, University of Notre Dame, 182 Fitzpatrick Hall, Notre Dame, IN 46556, Fax: 219-631-8366, markst@nd.edu**

***THE DEADLINE FOR AWARD NOMINATIONS IS April 15, 2002.***

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