

Computing and Systems Technology Division Communications



Volume 17, Number 1, Winter 1994



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About This Issue

by Peter R. Rony Joseph D. Wright, and
Jeffrey J. Sirola

Once again, CAST Communications reports excerpts from the nomination packages on behalf of the three CAST Division Award winners, which for 1993 are Dr. George Stephanopoulos, Dr. W. David Smith, and Dr. Yuris Fuentes. At the November AIChE meeting in St. Louis, Professor Stephanopoulos continued the tradition of outstanding, CAST-Division after-dinner speeches with his philosophical musings entitled, "Computers, Systems, Languages, and Other Fragments." The complete manuscript was too long for publication in this issue, so it is being serialized into Part I (Winter 1994) and Part II (Summer 1994). With some courtesy and cooperation, perhaps we will be able to obtain copyright clearances and be able to reprint the numerous associated figures in the Summer 1994 issue. Your editor was specially impressed by the following comments:

"There has been a lot of discussion about the fragmentation of our profession. Today chemical engineering is not as cohesive as it used to be 10 or 20 years ago. It is argued that the explosive expansion of the scope of the chemical engineering work has led to the loosening of the traditionally common language."

"To me it is a clear and unambiguous example of Babelism. Of course one might argue that the differences in detailed science developed by the various Divisions of AIChE do warrant a certain break in communication and understanding. This is very hard to accept. Extremely small (if any) amount of truly new science has been discovered. Most of the so-called new science is an invention (not discovery) of the particular researcher and lies in

the Flatland. Consequently, everyone should be able to understand it if they kept the same language."

It should be noted that Professor Stephanopoulos retains copyright ownership of his award address; this has been the policy of CAST Communications for many years. In this age of Internet, CD-ROM discs, information superhighways, and so forth, intellectual property rights such as copyright ownership become even more valuable. One question that was raised recently is, Why should copyright ownership of manuscripts describing Federally-funded research be completely and irrevocably transferred to scholarly magazine publishers, none of whom contributed to the sponsorship of the research? Follow-up questions include: Would the public be better served by allowing the Federal government, or the institutions at which the research was conducted, or the authors of the manuscripts, to retain certain rights to reprinting and dissemination? Will revolutionary changes in nationwide electronic communications provide authors with significantly less expensive but equally pervasive "marketing" methods for their research results? Food for thought.

We planned to publish the article, "Analyze the Life Cycle Costs of Distributed Control Systems," by James M. McClure, Jr. and David S. Seiver as Part I and Part II in the Summer 1993 and Winter 1994 issues, respectively. On January 18, 1994, we received the January 1994 issue of CEP with the complete article presented on pages 58-62. We have therefore decided that it would not be necessary to publish Part II in this issue.

New rules promulgated by the Executive Board of the AIChE programming committee are as follows: (1) No person may author or coauthor more than four (4) contributions (papers, posters, etc.) at any one AIChE meeting, and (2) No

person may author or coauthor more than one (1) contribution at any one session. These new rules become effective immediately.

Effective immediately, based on the successful experience of area 10b (Systems and Process Control), all proposals for CAST sessions at Fall Annual Meetings will be received centrally by the appropriate area chairs and reviewed by committees of session chairs for acceptance and session assignment decisions. To facilitate this CAST review process, the official proposal-to-present form with its camera-ready abstract for the program book should be accompanied by six copies of a more complete extended abstract of a length chosen by the author. It is also appropriate for the author to suggest the CAST session believed most appropriate for the contribution, but the final allocation of accepted presentations to sessions will be made by the area chairs. This centralized review policy will mean that deadlines for proposals for CAST sessions at annual meetings be advanced to March 1 of each year (approximately one month earlier than the generally published dates for other groups). The CAST-wide centralized review will only apply to proposals for presentation at Fall Annual meetings for which demand generally exceeds available programming space. It is also hoped that these procedures will in addition contribute to increased quality of CAST programming.

Because the decision to expand the centralized review for CAST programming at annual meetings was made by the CAST programming board in St. Louis only this November, notice of the new procedure may not reach all prospective authors for the 1994 San Francisco meeting. CAST area chairs have agreed to be as flexible as possible in this first year of the new policy.

The new deadline for the Winter 199x issue of CAST Communications is December 15, 199x (or preferably

December 1, 199x. Such a deadline is required because of (a) the new March 1 deadlines for spring meeting abstracts and (b) the new author limitation rules.

The AIChE Publications Department has recently offered to be responsible for a "Books of Interest" section in division newsletters. The Department would provide a list of titles, each with a short description, from which a newsletter editor would select those books that might appeal to members. CAST Communications will consider this service, but prefers that the information be provided electronically either as an ASCII-formatted file on diskette or as an Internet file available at AIChE headquarters.

Undergraduate enrollments at the sophomore level are booming in chemical engineering departments nationwide. Anecdotal figures indicate that such enrollments exceed the levels of the late 1970s and early 1980s. Campus employment centers, with their current focus on recruiters from large corporations, are likely to be inadequate to the task of providing opportunities for new ChE graduates. The AIChE should anticipate what may become the largest B.S. graduating class (in May 1996) in the history of chemical engineering.

The editor escorted a new AIChE student member at the 1993 AIChE Student Conference and Fourth Annual Career Fair in St. Louis. The activities—e.g., student chapters brunch, reception with AIChE leadership, workshop on student learning styles, and so forth—were very well done. A related activity, the Resume Round Table, was also useful. Disappointing was the Employment Clearinghouse, which had few jobs available for a large number of job seekers; the ratio of jobs-to-seekers was so low that it made the Clearinghouse a waste of time for most participants.

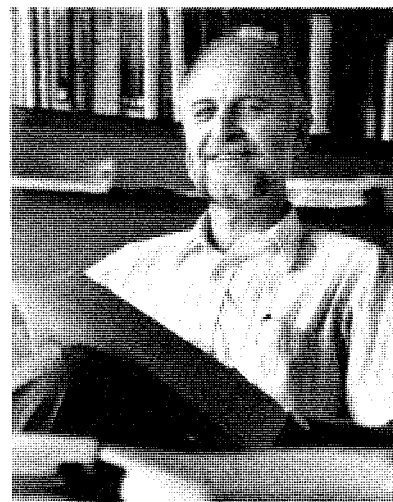
Job creation these days is not occurring at large corporations, which, in the opinion of the editor, seem preoccupied with riding the crest of the "downsizing" phenomenon whether or not it is absolutely necessary to do so. In the editor's opinion, the honor role of corporations include those which do not engage in excessive layoffs during a period when fired employees have serious difficulties obtaining new employment.

AIChE needs to rethink its current "paradigm" relating to job opportunities for chemical engineers. The December 20, 1993 memo by Frank Calautti and Herb Schefel—sent to all CAST Division members—is a welcome and innovative step in this direction. "The success of the [employment] clearinghouse depends largely on the number of companies that sign up to recruit at these meetings." The Chemical Exposition at the spring Houston meeting should provide substantially reduced exhibitor rates for booths occupied by small companies. Among other activities, the spring national AIChE meeting should have a strong and continuing focus on jobs.

*Send suggestions to the 1994
CAST Executive Committee.*

*Addresses and phones on
inside front page of CAST
Communications.*

**George Stephanopoulos is
Selected as the Recipient of
the 1993 CAST Division
Computing in Chemical
Engineering Award**



"For his pioneering research in Artificial Intelligence and its application to problems in chemical engineering, and the authoring of a widely used textbook," George Stephanopoulos, Arthur D. Little Professor of Chemical Engineering at M.I.T., received the 1993 CAST Division Computing in Chemical Engineering Award at the CAST Division banquet last November at the AIChE National Meeting in St. Louis. This CAST award is co-sponsored by Dow Chemical and SimSci.

His featured after-dinner presentation, "Computers, Systems, Minds, and Other Fragmented Thoughts," could serve as the basis for several provocative contributions to magazines in the field.

Professor Stephanopoulos was the subject of a nomination package that contained five supporting letters. Supporting statements in behalf of his candidacy included the following:

"There does not seem to be any area of process systems engineering in which

George has not made some seminal contribution, and the recognition of his many contributions through the CAST Division Computing and Chemical Engineering Award seems to me to be long overdue."

"The award is particularly appropriate because George has been a leader in the initiation of systematic chemical engineering research in Artificial Intelligence which is, for me, a synonym for serious applied computing. This work is outside the reach of conventional academic chemical engineering, while essential to the formalization of many areas of practice that beg for effective research and teaching."

"George has been one of the few contributors who has unhesitatingly attacked the broadest dimensions of chemical engineering thought. His imagination has always been equal to the task of identifying a suitable model for any issue. His insight has always been sufficiently perceptive to anticipate the likely problems to be encountered in the practical reduction of his proposals. His vision has been persistent and flexible, evolving over the years, as necessary, to achieve such a goal."

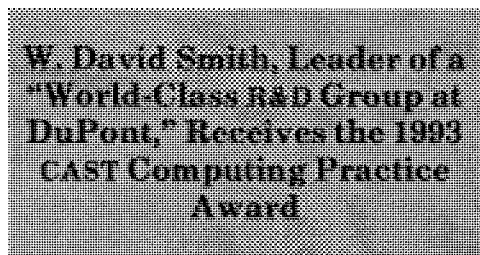
"In framing the LISPE group to carry out this kind of research, he has adopted Artificial Intelligence concepts and tools, but he has done so without abandoning process technology rigor or traditional wisdoms. Indeed, he has used the new attitudes to provide substance to technical problems that would otherwise lack a suitable framework. The effect of this is to integrate process and computer science technology in a way that captures the useful refinements in each."

"George is as close as one comes in our profession to a renaissance man. He writes beautifully, and his many books are classics of clarity, originality, and insight. He has made major, groundbreaking contributions in

design, control, process operations, and molecular synthesis. Add to the foregoing that George Stephanopoulos is one of the finest gentlemen that I have ever met and you may understand why I rank him at the very top of the engineering profession."

"Outstanding research accomplishments in support of the above statements are:

1. His work on temporal pattern recognition and the concomitant introduction of wavelets as a tool of importance to chemical engineers.
2. His work on the synthesis of chemical and biochemical reaction paths and the synthesis of molecules with desired properties.
3. His exploitation of object-oriented programming, expert systems, and AI to advance the state of the art in process design, as exemplified by DESIGN-KIT and BioSep Designer.
4. His applications of Artificial Intelligence to process operations and the sum total of his broad contributions in process control."



W. David Smith, Leader of a
"World-Class R&D Group at
DuPont," Receives the 1993
CAST Computing Practice
Award

The Computing Practice Award, sponsored by Pergamon Press, was given to W. David Smith Jr., who "has contributed greatly to the practice of chemical engineering computing through the development of systematic procedures for identifying those processes most in need of modern process modeling, optimization, and control, and then establishing a world-class R&D group [at DuPont] which impales these modern systems

methods on the target processes." He received his award at the CAST Division banquet on Tuesday, November 9, 1993 at the AIChE National Meeting in St. Louis.

Supporting letters and documents included the following comments:

"In the last few years, process control has become one of the centerpieces on the list of technology priorities for DuPont. Dr. Smith has played a key role by being the technology conscience for process control within DuPont. Dr. Smith has systematically raised the awareness of the importance of process control technology at all levels. He pushed for and then led a team comparing the application of process control technology in DuPont to that in outside companies. The significance of this benchmark study was not only its confirmation that the savings potential for process control was one of the largest business opportunities that DuPont could pursue, but also that it led to changes in the management process for control technology to provide strategic advantage."

"The impact of Dr. Smith's group has been extensive across DuPont Polymers. The businesses impacted include: Viton® fluoroelastomer, ethylene copolymers, Teflon® copolymers, Nordel® EPDM rubber, and Elvanol® polyvinyl alcohol. The group has been so successful that it has been expanded to serve DuPont's European operations. Dr. Smith's leadership, commitment to excellence, and dedication to doing it right the first time has made his organization successful."

"Prior to Dave's arrival at DuPont, their process control activities were largely located in the Engineering Department and tended to emphasize applications of existing control techniques. During the past decade, Dave's inspired leadership has brought process control to the forefront of DuPont's technical activities. I am not

aware of any other chemical company in this country or abroad that has anywhere near the talent and experience that DuPont has in modern process control. They are clearly the industry leader in this increasingly important activity. Not only did Dave personally recruit most of their control specialists, but more importantly, he had the drive and vision to establish process control as a major emphasis in DuPont. It is no exaggeration to say that without Dave's leadership and perseverance, the process program at DuPont would not have grown to its present stature. I have long been impressed by its breadth as well as its depth, since DuPont has done pioneering applications in a number of non-traditional areas of process control, specially neural nets."

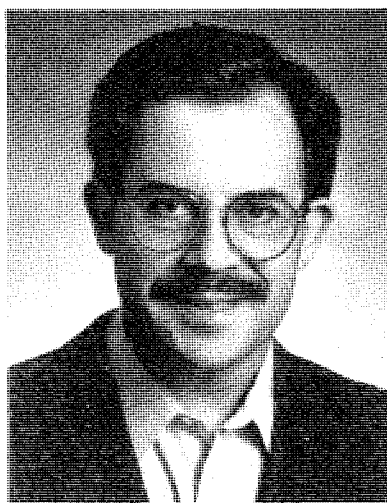
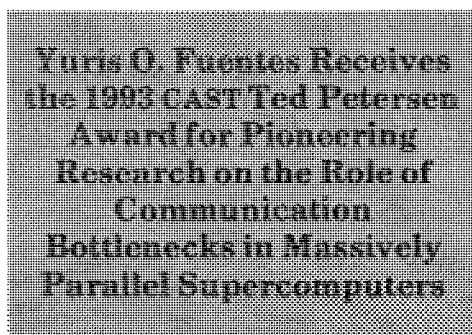
"Dr. Smith brings a unique combination of skills to his work. His leadership ability (convincing people of the right thing to do and empowering them to 'go for it'), his ability to remain technologically current, and his analytical acuity allow him to have a significant technical impact on the work of those whom he mentors."

"In an effort to foster communication between the academic and industrial sectors, and to encourage that the research is focused on real industrial problems, Dr. Smith has created two positions within his organization to be filled on a rotating basis by researchers from academia. One position is for recent graduates of process control who will move on to academic positions. The other position is for senior faculty members who desire to spend their sabbaticals working on industrially important process control problems."

"Dr. Smith has been an active participant in professional organizations that promote process control technology. Perhaps Dr. Smith's greatest contribution to these organizations beyond his influence on academic colleagues is his ability to get

his industrial counterparts to participate in guiding the profession."

"Through his broadly based contacts in the university, Dave was able to stimulate substantial DuPont funding for a large number of university process control research groups, and to successfully recruit top people from these universities for his group. As a result, his R&D group at DuPont has the reputation as the best in the industry."



Yuris O. Fuentes, assistant professor of chemical engineering at the University of Colorado, is the winner of the CAST Division 1993 Ted Petersen Student Paper Award "for outstanding research on the role of communication bottlenecks in massively parallel supercomputers and the creation of novel communication scheduling protocols to meet those challenges."

This award, co-sponsored by IBM and ChemShare, is given "to recognize an outstanding published work, performed by a student, in the application of computing and systems technology to chemical engineering." A plaque and check in the amount of \$500 was presented to Dr. Fuentes at the CAST Division banquet at the St. Louis AIChE National meeting in November 1993.

The citation for Dr. Fuentes was as follows:

"Yuris Fuentes, as a Ph.D. candidate at the University of Wisconsin, performed pioneering research in the design of algorithms for parallel computers to simulate the evolution of microstructures in complex fluids. He recognized that communication bottlenecks would be a major obstacle in the development of scalable algorithms for massively parallel computers. Yuris' ideas in communication scheduling strategies (there are four in all: spectral scheduling, stochastic scheduling, packet compactification by multipole expansion, and scheduling by Debye-Brinkman screening) are presented in the July 1992 issue of the AIChE Journal. This work thus represents an impressive advance in the design of parallel algorithms for an important class of computer simulations." "His ideas were ahead of his time in the sense that some of these scheduling concepts will work only when the number of processors is about 100 times what we have today, and if built today such a computer would consume almost all of the Federal budget on high-performance computing. However, technological trends indicate that such a computer will be built before the end of this decade. Moreover, his work is having an impact on the future design of high-performance computers because, in collaboration with makers of parallel computers, computer scientists are exploring the consequences of his scheduling

strategies on prototype simulations of future architectures."

Statements in supporting letters include the following:

"There is one other noteworthy feature of this paper: the influence of computational concepts from other disciplines such as quantum chemistry and process control (he has a strong background in these areas as well). The shift in the eigenvalues that result from hydrodynamic interactions between approaching particles is analogous to that seen in the formation of molecular orbitals from atomic orbitals in chemical bonding. His spectral analysis leads to an elegant prediction about the stability of the asynchronous interactions. The connection to time delays in process control was also quite powerful in a search for a way around the communication bottleneck."

"Yuris' Ph.D. research was at the cutting edge of research in the use of large scale parallel computers. Through his simulation of the motions of many particles simultaneously, each on a different node of the computer, he developed an ideal model problem for testing parallel computing strategies. The key issue explored in his work was how to design communication strategies between different nodes. The papers in AIChE J. and elsewhere were pioneering work in applying parallel computers to chemical engineering problems. This work is outstanding..."

"...the published work for which he is being nominated for this award is the development of parallel computing strategies for solving hydrodynamics problems. I encourage the committee members to read this paper for themselves. It is a real tour de force. If Yuris and Sang are correct in their prediction of the future of high performance computing, this paper

will become a classic. In any case, it is very high quality work."

"Even though the paper was presented within the context of microhydrodynamics, it actually covers enough ground on the general philosophy of computational simulations that I find the specific example more as an illustration of what is possible in general. It is, therefore, its potential ability to transcend the immediate subject matter of "microhydrodynamical applications" that, from my perspective, marks one of its strongest contributions. Parallel computational strategies, whether applied to the solution of a well-known problem in fluid mechanics or, for that matter, to the solution of a problem in large-scale industrial modeling, simulation, optimization and control, are based on certain fundamental principles which the paper, in my opinion, elucidates with unparalleled clarity."

"The paper is also outstanding in a stylistic sense: it is at once research-oriented and tutorial; managing to provide something for the specialist as well as the non-specialist within the available space; and doing so economically, clearly, and yet with uncompromising rigor. An award for such a contribution as this constitutes a strong encouragement for the kind of scholarship and careful presentation embodied by this paper."

*Nineteen CAST Division
Sessions at the 1994 AIChE
Annual Meeting
Atlanta, GA
April 17-24, 1994*

New CAST Division Officers Elected

Gary E. Blau 2nd Vice Chair

Gary Blau received his B.A.Sc. degree in chemical engineering from the University of Waterloo. He also received M.S. and Ph.D. degrees in chemical engineering from Stanford University. After working 12 years for Dow Chemical in the Computations Research Laboratory, he took a brief assignment with the Chemical Engineering Department at Carnegie Mellon University. He then rejoined Dow in the Engineering Research Laboratory. In 1989, he joined DowElanco, a joint venture between Dow Chemical and Eli Lilly and Company, as head of the Global Ag Math Modeling and Analysis group (GAMMA). GAMMA provides quantitative decision making and scientific computing expertise to the entire company.

During his career, Gary has been instrumental in promoting the incorporation of statistical concepts in the modeling area. He has published extensively, and is coeditor of the book "Environmental Exposure to Chemicals." Gary has served as treasurer and director of the CAST Division and is currently a member of CACHE.

Alan B. Coon Director (1994-1996)

Alan Coon is a senior staff engineer at Aspen Technology. His activities as a member of the plant operations team currently include work in on-line process modeling and real-time process optimization. Prior to joining the development staff at Aspen Tech, he

was a senior chemical engineer in the Applied Mathematics and Process Simulation group of Union Carbide Corporation. At Union Carbide his efforts focused on a variety of modeling activities, using both process flowsheeting and computational fluid dynamics methods to model steady-state and dynamic processes. Alan's chemical engineering education includes a Ph.D. from the University of Illinois, Urbana, where he also earned his M.S. in chemical engineering. He received his B.S. ChE from the University of Texas at Austin.

Alan's research and development interests are primarily concerned with numerical methods for chemical process simulation and their implementation on parallel computers. He has co-authored several technical publications and presentations, including several in CAST-sponsored sessions and conferences. Alan's activities for the CAST Division comprise chairing and co-chairing technical sessions at annual and national meetings of the AIChE, and participating in Area 10c and 10d programming sessions. He is also a member of the Society for Industrial and Applied Mathematics.

His main professional interests are in process control. He has made contributions to the development of nonlinear process control, robust control, and discrete-event systems. His main current interests are in the development of integrated process control and diagnostic systems, particularly with regard to the use of multiresolution techniques. Jeff has been actively involved with CAST. He has participated in the programming for area 10b at AIChE and ACC meetings. He has served as program chair for area 10d (Applied Mathematics). He has served as program vice-chair for both the ACC and CDC meetings, and is presently program chair for the 1994 ACC, to be held in Baltimore. For what it is worth, he is an Associate Editor for Automatica, and an Academic Trustee of the CACHE Corporation. Jeff has been responsible for the development of an email delivery system for programming information relevant to area 10b. That email list was started in 1991 following the CPC IV meeting, and has evolved to become the method of choice for delivering calls for papers, meeting announcements, and related information.

Jeffrey C. Kantor **Director (1994-1996)**

Jeff has been a member of CAST for 12 years. Currently professor of chemical engineering at the University of Notre Dame, Jeff received a B.S. degree from the University of Minnesota, and a Ph.D. degree from Princeton University in 1981, before joining the staff at Notre Dame. He received an NSF Presidential Young Investigator Award in 1985, and a Camille and Henry Dreyfus Teacher-Scholar Award in 1986. He has held visiting appointments at the University of Tel Aviv and at Imperial College.

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Articles

Computers, Systems, Languages, and Other Fragments – Part I

by ©George Stephanopoulos, 1993,
1994, *Laboratory for Intelligent
Systems in Process Engineering, M.I.T.*

***Note from Editor:** All cartoons [Figures 1-9 and 22-30] in this paper have been reproduced from various books of the Argentinean master Quino (Joaquin Salvador Lavado) except those in Figures 26 and 27, which are part of the work of Nurit Karlin. CAST Communications, in conjunction with Professor Stephanopoulos, will endeavor to obtain publication permission for all figures. If we are successful, they will appear in the Summer 1994 issue along with Part II of this award address.]

Foreword

This paper was the core of the after dinner presentation, given at St. Louis, as part of the annual ritual which follows an evening of CAST camaraderie, fine food and wine, and distribution of awards. As such, it was tailored to be entertaining, lightly provocative (with no trace of indigestion-causing substances), and sufficiently arousing to stem the rising tides of relaxation at that hour of the day.

I trust that the Computing in Chemical Engineering Award, of the AIChE's CAST Division, which gave me the opportunity to put the thoughts in this paper together, or any other award that the Institute of Chemical Engineers bestows yearly on a number of industrial and academic colleagues, has not been motivated by or has not

been perceived as a thumb-printing endorsement of personal imperatives and dictates, as the general in cartoon of Figure 1* is so happy to confer for a job-well-done, or an opportunity for the awardee to glow above others in clouds of self-gratification, like the angel of the cartoon in Figure 2*. Instead it will be seen as a recognition of the fact that, within the scope of the individual's contribution,

Είναι παιδιά πολλών ανθρώπων τα
λογια μας

"Our Words are the children of
many peoples"

as the Nobel laureate for literature, Greek poet, George Seferis, has told us, so succinctly.

With this preamble, I want to express my deep gratitude to the Awards Committee and members of the Institute's CAST Division for this honor. Also, I want to let them know that the works cited for this award, "are the children of many people." Let me take this opportunity to recognize them publicly (you see, when you recognize someone privately, it sounds too mushy):

- A. Some through the inspirational example, creativity, and friendship, have taught me so much, like Art Westerberg (the still incomparable teacher), Coleman Brosilow (for his harmonic musical counterpoints, in technical work, for I do not know his musical skills), Jim Douglas (for showing how far you can go by being the contrarian), and Manfred Morari (that lifting force from the flatland).
- B. Some through their indefatigable faith and commitment in pushing the state-of-the-art envelope in process systems engineering, gave me the stamina to resist, (a) first, the easy road of the fashionable trends in AI during the mid 80s, and (b) second, the doubting

Thomases as to what AI can do in process engineering.

I am talking about my students during the last 7 years. They are the main recipients of this award, and I dedicate it to them (Table 1). Today, whether they are distinguishing themselves in the academic world, or are becoming successful entrepreneurs (more precisely, multi-millionaires), or are affecting engineering practice, they can have the satisfaction that they have contributed to converting AI from a fringe to a mainstream technology in process engineering.

- C. Many industrial friends and collaborators have taught me over the last 7-8 years to approach with respect and humility the real industrial problems, for they are the only source of lasting engineering inspiration and far more interesting and enjoyable to work on, than the sanitized academic case studies that are destined to collect dust on a shelf.
- D. Finally, some through their personal support and inspiration, like my wife Eleni and my two children Nikos and Elvie, have given me so much, and have taught me so much, like, how inadequate I still am in the arts of:
 - (a) object-oriented programming (the lesson comes from Eleni, a true master of this art),
 - (b) Nintendo playing,
 - (c) the meaning of musical counterpoints, and
 - (d) appreciating the mythical worlds of C.S. Lewis and J.R.R. Tolkien

The last three, of course, are from Nikos and Elvie.

Computers: The Wonderful Becomes Familiar and the Familiar Fills You With Wonder

What can computers do in the future that they are not doing today, and the c

Table 1

The Students to Whom the 1993 Computing in Chemical Engineering CAST Award Was Dedicated

Michael Mavrovouniotis	Northwestern University
Michael Gevelber	Boston University
Bhavik Bakshi	Ohio State University
Matthew Reaff	Georgia Institute of Tech
Thomas Meadowcroft	MIT, Stn Dir., Practice School
Pedro Saraiva	University of Coimbra
Chonghun Han	MIT
Rama Lakshmanan	
Kevin Joback	Molecular Knowledge Systems
Christopher Nagel	Molten Metal Technology
James Johnston	Molten Metal Technology
John Carrier	MIT
John Calandranis	MIT
Charles Siletti	Mobil Res. & Dev. Co.
Jarvis Cheung	Shell Develop. Co.
Theodore Kritikos	Greek Bank of Indust Devel



FIGURE 3. *The Royal Theme.*



Figure 3

orollary question; how will they affect education and research?

As Jerry Fodor has observed¹, "...Some philosophers hold that philosophy is what you do to a problem, until it's clear enough to solve it by doing science. Others hold that if a philosophical problem succumbs to empirical methods, that shows that it wasn't really philosophical to begin with. ..." In the twentieth century, no subject has proved the validity of the above observation more than the computer and the ongoing debate as to whether one can create a formal system that can turn the human intelligence into an algorithmic procedure.

Roger Penrose has stipulated two versions of AI:

- The *Strong* version, that we will call *Artificial Intelligence*, attempts to fulfill the age-old dream, i.e. to have machines which have conscious awareness and can behave like humans, exhibiting intelligent behavior and generating new knowledge.

- The *Soft* version, that we will call, *Applied Intelligence*, more modest in its aims and tries to generate machines which have *non-trivial* behavior.

We will see later on that the Strong version is tightly bound to Goedel's theorem of incompleteness, and thus impossible. But, the Soft version is very much a reality, a reality that can and has led to capabilities that are both marvelous and wondrous.

So, first let us take a brief and cursory look at the wonderful world of artistic systems drawn from the world of music, literature, and the visual arts, and ask some pivotal questions regarding the relationship between computers and art.

Bach's "Musikalisches Opfer"

We will start with a musical piece. It is the "Musikalisches Opfer," i.e. Musical Offering by Johann Sebastian Bach. This is a system of marvelous technical complexity. It consists of sixteen parts and Johann Sebastian Bach composed

and executed its most complex part, a *6-part fugue* while testing a series of pianofortes for Frederick the Great, King of Prussia. Bach titled the 6-part fugue, *Ricercar* (to seek) a 6, and is indeed a continuous blending of six voices with an interminable evolution of a searching spirit. Douglas Hofstadter the author of the Pulitzer Prize acclaim for his book *Goedel, Escher, Bach: An Eternal Golden Braid* points out that the composition of a 6-part fugue could be likened to the task of playing 60 blindfold games of chess and winning them all. An 8-part fugue is considered to be beyond the grasp of the human capability. When one reads through the analysis offered by musical critics on the Musical Offering, here is what one finds:

1. The 6-part fugue is based on the "Royal Theme," shown in Figure 3.
2. It uses ten canons, i.e. ten rules, which are applied in various combinations.

For example,

- One canon specifies the timing of every part (voice) subsequent to

the first. Note that every voice sings the same theme, i.e. the Royal Theme.

- Another canon dictates that each note in the main theme must serve six purposes (for a 6-part fugue); i.e. be part of the melody sang by one voice and form a component of *consistent* harmony for each of the other 5 voices.
- Another canon staggers the Royal Theme sang by the 2nd, 3rd, 4th, and 5th voices in *pitch*.
- Another canon inverts the theme, i.e. in order to make a melody, whenever the original theme *jumps down* the subsequent voice *jumps up*, and vice versa, etc.

We will not try to cover all technical intricacies of Bach's "Musical Offering" in this paper, Hofstadter gives a wonderful discussion in his book, but an important lesson must not be lost: *Bach created a work of lasting value by using, explicitly and deliberately, a very simple alphabet* (the Royal Theme) *and ten explicit rules for the harmonization of the several voices*.

So, could a computer have created the "Ricercar a 6," i.e. the 6-part fugue of the Musical Offering? YES, if it had in its database:

- (a) the description of the main theme, i.e. of the Royal Theme,
- (b) ten procedures to emulate the ten canons (rules) that Bach used, and
- (c) rules to evaluate the harmonization of the notes sang at the same time by the various voices.

As a matter of fact, Kemal Ebcioglu published in 1984 a program for harmonizing chorales in the style of Johann Sebastian Bach. This program has managed on several occasions to produce Bach's solutions exactly, and has had a tremendous impact on the musical pedagogy, since Bach's chorales are the paradigm for

traditional studies in musical harmony.

A word of caution is in order here:

- The ten canons that Bach used were not new, but had been in use for quite sometime by him and by others.
- The rules that define the harmonic value of the result from the application of a canon, were fairly well known and taught as such at the time that Bach lived.
- The Royal Theme, though, which represents the alphabet, the building block that Bach used for the writing of the fugue *was not known* and there is no known way that the computer would have created it, given the basic notes and the requirement that it should allow the construction of a 6-part fugue. But, it was not Bach who composed the Royal Theme. It was given to him by Frederic the Great, King of Prussia.

So, the only component of the Musical Offering that could not have been derived by the computer *is not the work of a master*, but the product of an average student of music. This is remarkable because the lasting value of Bach's particular work is based on his unbelievable ability to synthesize existing knowledge into forms that defied the abilities of his contemporaries.

Poetry and the "Kurtzweil Cybernetic Poet"

This time we will go to the literature, and specifically to poetry. In the following paragraphs we can read four stanzas of poetry; two composed by William Carlos Williams and two by the computer:

I

*I am lonely, lonely.
I slap an answer myself
she hides deep within her
yet plays—
Milkless*

II

*is a steady burning
the road the battle's fury—
clouds and ash and waning
sending out
young people*

III

*pink confused with white
flowers and flowers reversed
take and spill the shaded flame
darting it back
into the lamp's horn*

IV

*the days locked in each other's arms
seem still
so that squirrels and colored birds
go about at ease over
the branches and through the air*

Let us look at the first of them; was this poem written by a computer or by William Carlos Williams? Polling done by Raymond Kurtzweil² indicated that only about 55% of adults with moderate experience in poetry and computers were able to identify the correct author, i.e. just a little over the 50% resulting from random choice. With young children the success rate was 48%, i.e. just about the expected random pick. An ad hoc polling of the participants at the CAST dinner turned approximately 40% with the correct answer. Why don't you try your own educated guess.

Well, the I and II stanzas were composed by the "Kurtzweil Cybernetic Poet", a program written by Raymond Kurtzweil, and the other two by Williams Carlos Williams.

How does the program create stanzas of poetry? The program is given an input file with poems written by a human author or authors. Then, it analyzes these poems and creates a word-sequence model based on the

poems it has just read. It then writes original stanzas of poetry using the model it has just created. The "Kurtzweil Cybernetic Poet" has created some original word-sequence models from the combination of its experience with poems of T.S. Elliott, William Carlos Williams, and Percy Shelley.

Matthew Reaflf at Georgia Tech has developed a program, which monitors and analyzes the behavior of branch-and-bound algorithms while it solves a combinatorial problem. From this experience the program deduces generic rules, which when used at a subsequent problem, improve the efficiency of the branch-and-bound algorithm.

But, let's return to the "Kurtzweil Cybernetic Poet." Alan Turing (the father of the modern digital computer) devised a test to evaluate the intelligence of a machine. If a human, observing the behavior of a machine and of another human, could not distinguish whether it was the machine or the other human that exhibited a certain response, then one could claim that the machine exhibited intelligent behavior. So, could we use the polling results on the success rate of humans in picking the correct author of the above stanzas as a successful instance of the *Turing Test*?

YES and NO. The "Kurtzweil Cybernetic Poet" can create short stanzas of poetry, but it cannot as yet create sensible poems of significant length with poetic symmetry and thematic uniformity. It is hard for the computer to *reflect upon itself and its work, and generate and evaluate new poetic themes, not available in its database.*

But, let us look at another effort. In the following lines we can read a poem from a book titled, "*The Policeman's Beard is Half-Constructed*;" the first book written entirely by a computer program called, RACTER, authored by

William Chamberlain and Thomas Etter:

Love is the question and the subject of this essay.

*We will commence with a question:
does steak love lettuce?*

This question is implacably hard and inevitably difficult to answer.

*Here is a question:
does an electron love a proton,
or does it love a neutron?*

*Here is a question:
does a man love a woman or,
to be specific and to be precise,
does Bill love Diane?*

The interesting and critical response to this question is: no!

*He is loony and crazy about her.
That is not the love of steak and lettuce,
of electron and proton and neutron.*

*Love is interesting to me
and fascinating to you, but
it is painful to Bill and Diane.*

That is love

Well, it does have a thematic consistency, and certainly a refreshing look at certain aspects of the physical world, but, you can discern with high probability that it was written by a computer, or a truly avant guard poet, which is probably the same thing.

Here is another poem, a Haiku poem in this case, composed by a program written by Margaret Masterman and Robin McKinnon Wood, with unifying thematic content and more grown up aesthetics:

*eons deep in the ice
I paint all time in a whorl
bang, the sludge has cracked*

*eons deep in the ice
I see gelled time in a whorl
pffftt the sludge has cracked*

*all green in the leaves
I smell dark pools in the trees
crash the moon has fled*

*all white in the buds
I flash snow peaks in the spring
bang the sun has fogged*

The Visual Arts and "Virtual Worlds"

Now, let's turn our attention to the visual arts, e.g. drawings and "photographs." The "free-hand" drawing in Figure 4* was developed by a computer program called, AARON, written by Harold Cohen. The interesting aspect of AARON is the fact that the program *did not have in its database any of the figures that you see in the drawing.* So, what you see, e.g. the "humanoids," "plants," have been *synthesized* by the computer on the basis of the available knowledge it had about the components of each object it drew, e.g. a body, hands, legs, stems, leaves, their relationship to each other, their relative sizes and location, general features, etc. An important lesson can be drawn from Cohen's work: *the computer can invent new artifacts that the programmer did not explicitly describe.*

Obviously this example makes a very strong suggestion that the synthesis of novel molecules, reaction pathways, processing systems, control structures, manufacturing systems, etc. are within the computer's grasp. In other words, the computer *can invent new artifacts given a set of elementary pieces as well as their allowed relationships.* We already have many examples of computer-aided systems with such capabilities.

Now, let's contrast the *invention* to the *discovery.* In the following pictures we

will see the computer discovering new worlds. For example, see the copy of the photograph shown in Figure 5*. This photograph was not taken by a camera, but it was completely generated by a computer, using fractal elements that Mandelbrot (of the Mandelbrot fractals fame) generated using the Julia sets. It is called "Planetrics Over Labelgraph Hill;" a souvenir from a Space Mission That Never Was.

Similarly, Figures 6* and 7*, let's call them "Photographs of a Virtual World," were generated by computer programs, which did not possess in their data bases any of the depicted elements. Specifically, Figure 6* shows the *Fractal Mountains*, created by B.B. Mandelbrot using fractal geometry. Similarly, *Point Reyes* in Figure 7* is an elaborate scenic view created entirely by the computer using a variety of techniques, including chaotic fractals.

What Does All This Mean?

"So, What?" A skeptic may ask, and indeed I have been asked this question many times. *"George, are you trying to suggest that the above examples are manifestations of the computer's long-awaited intelligence?"*

Well, I do not know. But, now that I have explained to you how the computer did it, you are not very impressed. That reminds me of how Sherlock Holmes reacted when a man questioned the brilliance of his inductive reasoning in solving one of his cases:

Mr. Jabez Wilson laughed heavily. "Well, I never!" said he. "I thought at first that you had done something clever, but I see that there was nothing in it, after all?" "began to think, Watson," said Holmes, "that I made a mistake in explaining. 'Omne ignatum pro magnifico,' you know, and my poor

little reputation, such as it is, will suffer shipwreck if I am so candid"

Also, Alan Turing, the father of the digital computer and creator of the Turing Test for checking the "intelligence" of a machine, put it this way:

"The extent to which we regard something as behaving in an intelligent manner is determined as much by our own state of mind and training as by the properties of the object under consideration. If we are able to explain and predict its behavior or if there seems to be little underlying plan, we have little temptation to imagine intelligence. With the same object, therefore, it is possible that one man would consider it as intelligent and another would not; the second man would have found out the rules of its behavior."

So, it seems that we will have to postpone answering the above question until later on.

I have drawn all the previous examples from the arts; music, literature, visual arts. I have not said anything about the engineering or scientific applications of an "intelligent" computer. There are two reasons for this choice.

1. First, I am sure that you have been inundated with technical information on the advances of Soft AI, i.e. Applied Intelligence, in engineering applications, manufacturing, the sciences, the evaluation of securities in the Wall Street, medicine, and many other areas of purposefully utilitarian activities.
2. Second, in art the measures of evaluation are very obscure, implicit, and subjective; much more so than in engineering or science where physical laws, monetary objectives, codes of safety, environmental regulations, and others provide fairly explicit

and consistent guidelines for the creation and evaluation of new objects, e.g. products or processes.

But, now is the time to return to the technical essentials on the use of computers. I will not try to bore you with computer-science lingo, but it is of critical importance to try to look at a couple of technical issues at a closer range.

Bibliography

- 1 Jerry A. Fodor, *"Representations: Philosophical Essays on the Foundations of Cognitive Science."*
- 2 Raymond Kurtzweil, *"The Age of Intelligent Machines."*

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1/4 page	=	\$60
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2/3 page	=	\$120
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Communications

25th Anniversary CACHE CD-ROM

by Peter R. Rony

CACHE (Computer Aids in Chemical Engineering), a not-for-profit organization that serves chemical engineering departments, plans to celebrate its 25th anniversary at the San Francisco AIChE National Meeting, November 13-18, 1994. Timed shortly after this meeting will be the publication of a 25th Anniversary CACHE Monograph (edited by Brice Carnahan) and the distribution of a 25th Anniversary CACHE CD-ROM (edited by Peter Rony).

The objectives of the CD-ROM are: (a) to demonstrate new computer technology (e.g., graphics, digital images, digital audio, digital video, digital animation, sequential presentations, multimedia presentations) useful in chemical engineering education; and (b) to provide a set of software "deliverables" to the target audience—ChE students and faculty—for the CD-ROM.

Based upon brainstorming sessions at the St. Louis CACHE trustees meeting (November 1993), we have an initial—but not exhaustive—listing of potential contributors to the 25th Anniversary CACHE CD-ROM.

Individuals and spokesmen for organizations oriented towards chemical engineering education and training are invited to contribute to the 25th Anniversary CACHE CD-ROM. In this first call for CD-ROM files, we seek to identify: (a) those individuals and organizations who desire to contribute to the CD-ROM; (b) individual and organization memory requirements for the CD-ROM, in

quantities of either 1 MB, 2 MB, 5 MB, 10 MB, or 25 MB; and (c) the financial resources available for the production and distribution of the CD-ROM.

One CD-ROM will be provided at no charge to each CACHE member chemical engineering department. CD-ROM discs with associated single-user licenses will also be sold to individual ChE students and faculty for a price predicated upon an initial production of a minimum quantity of 200–300 CD-ROM discs.

Because of software license restrictions for some of the educational software, it has not yet been decided whether or not to sell the 25th Anniversary CACHE CD-ROM to individuals or organizations within industry or government.

This is a generic "Call for Files." Specific details about the possible nature of your, or your organization's, contribution should be negotiated with the editor of the CD-ROM. The key constraint is the 600 to 640 MB memory limit of a single CD-ROM disc. Potential contributions and contributors include the following:

DCAPII (100-compound student version, plus manual [DIPPR])

CCPS/SACHE ("Sampler" of activities)

PICLES/DIGEST (Software plus manual [CACHE])

POLYMATH (Software plus manual [CACHE])

CHEMSEP (Software plus manual [CACHE])

Brice Carnahan (Templates plus manuals [CACHE])

25th Anniversary Monograph (22-chapter electronic book [CACHE])

Case Studies (Selected case study/studies [CACHE])

Purdue Video (Excerpt of one of Purdue videos [CACHE])

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Computer magazine contributions

ChE Textbook solution manuals, perhaps encrypted for faculty use

This is an exciting endeavor that CACHE hopes will positively influence chemical engineering education during the 1990s. CACHE encourages and solicits your participation. Please communicate your ideas and suggestions to the CACHE CD-ROM technology task force chairman, Peter R. Rony, Department of Chemical Engineering, Virginia Tech, Blacksburg, VA 24061-0211. Phone: (703) 231-7658. Fax: (703) 231-5022. Email: RONY@VTVM1 (Bitnet); RONY@VTVM1.CC.VT.EDU (Internet)

The Adobe Acrobat User Group Program

by Rye Livingston, Adobe Systems

[Note From Editor: In an effort to promote Adobe Acrobat technology, Adobe Systems announced the Adobe™ Acrobat™ User Group Program late in 1993. The bottom line is that only a single \$100 payment is required for two copies of Acrobat Distiller, two copies of Acrobat Exchange, and copies of Acrobat Readers to all group members. The editor, who is a member of both CACHE and the CAST Division, suggests to the respective executive committees that both of these groups immediately consider participating—at a total cost of \$100—in the Adobe Acrobat User Group program. The key issue is the definition of a user group. According to the Adobe License Agreement:

“1.4 ‘User Group’ means a computer user group that meets, at a minimum, the following criteria: (i) the User Group must have elected or appointed officers that represent the Members, (ii) the User Group must have existed for at least six (6) months prior to the date the Application is executed, (iii) the User Group must have a minimum of forty (40) Members; (iv) the primary purpose of the User Group must be to disseminate information regarding computer hardware and/or software usage, and (v) the User Group must have an established means for distributing information, e.g., via a newsletter. Adobe may, in its sole discretion, waive one (1) or more of the above criteria on a case by case basis.”

Both CACHE and the CAST Division meet all five criteria. Members of the CAST Division who like this idea are encouraged to send the chairperson of CAST vigorous admonitions that we proceed with this \$100 opportunity. Additional information about the program is provided below. Other computer-oriented organizations

known to CAST Division members may benefit as well.]

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Thank you for your interest in the Adobe Acrobat User Group Program. We have designed this program to provide user groups with all of the software needed to begin communicating electronically using Adobe Acrobat. For details, please review the “Questions & Answers” below. By providing Acrobat Reader to all members of your group, you can distribute your newsletters, meeting minutes and other user group communications in the most time-efficient, cost-effective way—electronically, instead of on paper. Don’t miss this unique opportunity to help your group speed ahead on today’s digital highways. Send us your application today!

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Adobe Acrobat User Group Program: Question & Answers

What is the Adobe Acrobat User Group Program?

The Adobe Acrobat User Group Program is designed to give computer user groups an easy way to explore the electronic communication capabilities of Adobe Acrobat Software.

What is Adobe Acrobat?

Adobe Acrobat is a family of software products that enables users to create and distribute electronic documents in a cross-platform file format, the Portable Document Format (PDF). PDF files preserve the essential look and feel of a document, regardless of the originating hardware platform,

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What kinds of products does Adobe Systems develop?

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- Macintosh Plus, SE, Classic®, LC, II, PowerBook™, Centris®, or Quadra™ (II, PowerBook, Centris, or Quadra recommended) (*Trademarks or registered trademarks of Apple Computer, Inc.*)
- Apple® System Software version 6.05 or greater (version 7.0 or greater recommended)
- 2 MB of application RAM (4 MB recommended)
- 800K or Apple SuperDrive floppy disk drive

Windows is a trademark of Microsoft Corporation. Acrobat is a trademark of Adobe Systems.

Apple Launches Software Dispatch

by Christopher Escher and Whitney Greer

[**Note From Editor:** The editor received the following news release recently. This is one of several new purchase-software-by-CDROM marketing endeavors. Your editor's key question is, Are the software prices mentioned on the CD-ROM list or discounted? He fears that at present this will be the most expensive way to purchase computer software, with 100% list price charged. An impulse buy. According to an item in the November 1993 issue of Newmedia, "Shoppers can navigate unlocked documentation using an Adobe Acrobat viewer." Also, "Of the top 25 best-selling CD-ROM titles in May, CD-ROM samplers from Aris Entertainment, Electronic Arts, and Compton's New Media ranked second, third, and fourth, respectively, according to PC Research..." According to an Adobe Systems press release, "Adobe Acrobat Included in New Software CD-ROM Product from Apple. Adobe Acrobat for Windows Offers

Access to Online Documentation with Apple's Software Dispatch."]

Apple Computer has introduced an extremely convenient way for people to explore and purchase software for Macintosh® and Windows personal computers. Software Dispatch™—a CD-ROM delivery system as well as a new business unit at Apple—allows customers to try, compare, and buy popular software applications 24 hours a day, seven days a week, in the comfort and convenience of their home or office. When customers call the Software Dispatch 1-800 number to order, they receive an unlocking key upon telephone purchase that lets them immediately install and use their software. Software Dispatch CD-ROM discs are scheduled to be distributed by mail, free of charge beginning November 1993 to Macintosh CD-ROM owners and early 1994 to Windows CD-ROM owners.

The first Software Dispatch CD-ROM disc features more than 80 applications, including a broad offering of productivity, utilities, education, games, fonts, clip art, and other applications. Software vendors with products featured on Software Dispatch CDs include Symantec, Claris, Intuit, MECC, Software Ventures, Spinnaker, and Vividus.

"We're committed to providing superior software solutions to both Macintosh and Windows customers," said David Nagel, senior vice president and general manager of the AppleSoft division at Apple Computer, Inc. "Software Dispatch is more than a new business for Apple—it's a whole new way for the industry to bring solutions to a broad reach of target customers."

"With Software Dispatch, customers can now compare applications on their desktop, as well as order and install software immediately without waiting for overnight delivery. Technical support for purchased products can be easily referenced via a consolidated list

of vendors and telephone support lines on the disk."

The Shopping Experience

When a Windows or Macintosh customer first explores the Software Dispatch CD-ROM disk, a QuickTime™ movie tutorial is available to explain the trial and purchase process. Customers can then interactively discover the features and benefits of specific software via guided tours, limited trial versions, and product information sheets. Once a selection has been made, the customer clicks an order button that automatically adds the software to an electronic order form. When customers are ready to buy, they call the Software Dispatch 800 number to receive a key that unlocks the software allowing them to immediately install the application directly from the CD onto their hard disk. The unlocking mechanism also gives customers access to on-line product documentation that is identical in content to the print version traditionally delivered in a software box.

"The time has come for electronic distribution of software," said Scott Schnell, general manager of Software Dispatch at Apple Computer, Inc. "And, Software Dispatch sets the standard for convenience, breadth, and affordability. We believe that our electronic superstore—with its easy to use, well organized information—will appeal to both current and new users of personal computers and applications software."

Leading-Edge On-Line Documentation

Software Dispatch takes full advantage of CD-ROM storage capability by providing more than 12,000 pages of on-line documentation. Manuals for each purchased product are presented on the desktop using Apple's DocViewer™ technology for the Macintosh version of Software

Dispatch and Acrobat Reader technology for Windows from Adobe Systems Incorporated for the Windows version. Both provide navigational tools that let readers quickly search through documentation to find the answers that they need. The Software Dispatch documentation preserves fonts, layouts, photos, and other visual graphic features and lets users move through pages instantly using bookmarks, hypertext links, and keyword search functions. Users may also print any or all manual pages for deskside reference. Hard copy documentation will also be available from Software Dispatch upon order.

"CD-ROM-based software distribution is rapidly gaining momentum in the marketplace," said David Pratt, senior vice president and general manager for Adobe's Application Products Division. "What distinguishes Software Dispatch as a software shopper's resource is not only its array of available applications, but advanced electronic documentation readers such as Acrobat, that make the customer's experience easier and more consistent."

As part of its offer to software vendors, Software Dispatch assumes responsibility for producing and distributing the CD-ROMs, giving vendors a low risk of directly reaching customers in their home or office. For both large and small developers, Software Dispatch is a powerful venue for getting their product onto a customer's desktop.

"By allowing customers to try before they buy, Software Dispatch helps the customer make a more informed decision when purchasing an application like Quicken," said Eric Tilenius, Product Manager at Intuit, Inc. "By actually using Quicken in the convenience of their home or office, they find out just how fast and easy financial work can be and as a result,

can act on their discovery by making an immediate purchase."

Availability

Software Dispatch for Macintosh is planned for availability November 1993 and Software Dispatch for Windows is planned for availability the first quarter of Calendar Year 1994. Software Dispatch is planned for availability in other selected markets worldwide beginning the first quarter of Calendar Year 1994. In November 1993, Software Dispatch plans a direct mail campaign and direct response advertising. To receive a free Software Dispatch CD-ROM, call 1-800-937-2828, ext 600.

Software Dispatch is a business unit of Apple Computer, Inc.

Headquartered in Cupertino, Calif., Apple develops, manufactures, and markets personal computer, server, and personal interactive electronic systems for use in business, education, the home science, engineering, and government. A recognized pioneer and innovator in the personal computer industry, Apple does business in more than 120 countries.

Participation

If you are interested in applying for participation, please obtain a copy of an application and send it with a shrink wrap version of each product to: Liz Westover, Software Dispatch, MS: 303-4S, 20525 Mariani Avenue, Cupertino, CA 95014. Phone: (408) 862-7000. Fax: (408) 862-3349. All products will be carefully reviewed for the CD taking into consideration a variety of logistics and marketing criteria. Of course, the sooner we receive your product, the more time we will have to thoroughly review your product.

The First PC Magazine CD-ROM

by Michael J. Miller and Peter R. Rony

Your editor responded eagerly to an advertised special offer: "The PC Magazine CD For Only \$14.95." He called 1-800-787-9677 and charged the \$14.95 + \$3.00 shipping costs for a single disc. He was not disappointed with the product, which provided an excellent example of how to create a CD-ROM for a user. On January 9, 1994, he attempted to order a second disc only to learn that it was sold out. On the insert, the following was written:

"Welcome to the Very First PC Magazine CD!

"On this CD-ROM, we've combined some of our favorite features from PC Magazine with some extras that we simply cannot supply in a paper publication.

"This disc is being published concurrently with the December 7, 1993 issue of the magazine. It contains the full text and the benchmark results from that issue's two main articles: our 486 Buyers' Guide and a comparative review of the top 43 video boards.

"Both of these articles are presented in a new format that we think makes them very accessible. To complement this, we've included our latest benchmark tests, developed with Ziff-Davis Benchmark Operation. These will allow you to test your system against any of the products reviewed in this issue, and you can even get a graph showing how your machine stacks up.

"Some other features make this CD very different from the printed publication. To accompany our stories on multimedia presentation packages, we have included samples created in some of the top presentation packages. After all, seeing is believing. In the

same vein, we have included two of our free utilities.

"As a special bonus, our colleagues at Computer Library made it possible for us to provide you with a full year of articles from PC Magazine. The new searchable text engine used with the Computer Select database lets you track down any article that has appeared since October 1992.

"On this CD, a lot of what we have done is an experiment in electronic publishing that we hope you'll find useful and interesting. (To learn more about what that experience was like, see my column under the CD's 'Welcome' statement.) Do you like the CD-ROM as a medium? Would you like to see similar discs on a regular basis? What additional information could we put on the disc? You can drop me a line at PC Magazine, One Park Avenue, New York, NY 10016-5802, or send me an electronic message via CompuServe or at the PC Magazine Editorial Forum on ZiffNet (GO ZNT:Editorial). You can even access CompuServe with the new version of WinCIM, included on this disc. We look forward to hearing from you.

Michael J. Miller
Editor-in-Chief"

Also printed on the CD-ROM insert was a "License Agreement for PC Magazine CD™." To summarize, it stated that the Collection of files on the CD-ROM disc was licensed to the user subject to the terms of the agreement. Included in the terms were: (1) limited, non-exclusive, nontransferable license to use the Collection; (2) The user simply uses the Collection, and does not reproduce, publish, rent, lease, sell,... the Collection; (3) The user does not remove or obscure any copyright notices; (4) The only warranty is for the physical media, the CD-ROM disc; (5) The Collection is provided "as is" without warranty of any kind; (6) U.S. Government restricted rights; and (7) The agreement is governed by New York law.

One very interesting feature of the first "PC Magazine CD" was the fact that it contained a licensed copy of (Adobe Systems') Acrobat Reader for Windows. At current prices of Reader to non-academic purchasers, the CD-ROM disc was a bargain just to obtain this software. The software came with a registration sheet in *.PDF form that could be printed and mailed to Adobe Systems.

Despite a few bugs, your editor believes that this specific CD-ROM disc can be used as an outstanding model of how to present electronically a large and diverse collection of files—text, images, Acrobat *.PDF files, sounds, animations, and digital video—to a user. He compliments the editor of PC Magazine, Mr. Michael J. Miller, for his management of a pioneering achievement in electronic publishing.

The price of admission to the future world of personal computers is the purchase of a double-speed (or higher speed) CD-ROM drive. The CD-ROM version of PC Magazine has the advantage of the extra goodies—e.g., executable software, commercial software demos—that can be provided.

Virginia Tech Produces Second Engineering CD-ROM for Undergraduates

by Peter R. Rony

A second "Engineering Tools" CD-ROM disc was produced by Professor Joe G. Tront, assistant dean of engineering computing, during January 1994. It was distributed to all of the 1000+ engineering freshmen in the college of engineering. Though your editor admits a conflict of interest in reporting this news item, there are lessons that need to be conveyed to organizations that contemplate similar actions in the future.

First, the capacity of a CD-ROM disc, up to 640 MB, is enormous. Unless you have files—digital audio, digital video, or high-resolution digital images—that consume large amounts of memory, you may have to deal with thousands of files and hundreds of subdirectories. Second, be suspicious of the quality of your final product, for example, a CD-R that is sent to a CD factory for replication. Test your files at each stage. The most likely stage at which files can be corrupted is the transfer stage to a CD-R machine. Turn off ISO-9660 requirements if you have files that have non-ISO-9660 symbols such as \$, - (dash), and so forth. Only the underscore, _, is an allowed symbol in ISO-9660. The \$ symbol is frequently observed in files associated with install or setup.

Third, be prepared for unusual results with memory when you transfer 100s of megabytes of files. For example, 125 MB of files on a magneto-optical disk (128-MB capacity) yielded 155 MB, or 180 MB, or more of total files on a 1.6 GB hard disk drive. The explanation? The jury is out, but the current hypothesis is that the sector sizes on the two disks was different, with the consequence that small files (each consuming one full sector) had different memory requirements on the magneto-optical and large hard disks.

Fourth, test, test, and further test your files. Does a CAST Division member know of a DOS or Windows utility that permits the byte-by-byte comparison of nested subdirectories on different drives? The DOS COMP.EXE utility can compare only directories that are not nested. The more CD-ROM work one does, the more necessary is a nested subdirectory file comparison utility.

Fifth, not all software runs from a CD-ROM (or from a write-protected disk). Notify a user of the CD-ROM in advance if this situation exists. Sixth, sometimes it is preferable to allow a user of software on a CD-ROM to use the SETUP or INSTALL utilities for Windows.

The reason is to facilitate the creation of a group of icons. Seventh, software that can be either executed directly from or stored (as a database) on a CD-ROM frees up valuable and more expensive hard disk memory.

Eighth, consider the “paradigm” by which users will select and use the files on the CD-ROM. As an example, the magazine paradigm used by the PC Magazine CD-ROM (discussed elsewhere in this newsletter) was excellent, in the editor’s opinion. In contrast, the Virginia Tech 1994 Engineering CD-ROM paradigm was a set of nested subdirectories. It should be understood that the creation of a “paradigm” requires resources. It is likely that skeleton paradigms—such as the PC Magazine format—will make the process easier for future creators of CD-ROM containing hundreds to thousands of diverse files.

Ninth and finally, the best way to understand the promise and problems associated with CD-ROM technology is to start working with it. Make your mistakes now on the path of creating magnificent CD-ROMs in the future.

Testing of AICHeExchange Bulletin Board

by Mary Markette, AICHe Staff

The following, October 27, 1993 memorandum was circulated to members of the CAST Executive Committee at the St. Louis National AICHe meeting on Monday, November 8, 1993.

“To: Michael Doherty (CAST Division)
Billy Rodgers (Fuels & Petrochemicals Division)
Thomas Gibson (Safety & Health Division)

Richard Noble (Separations Division)

Danny Reible (National Program Committee)

“From: Mary Markette, AICHe Customer Services and Administration

“We plan to begin testing our new electronic bulletin board by the end of the year, and to do a formal launch at the Spring National Meeting next April.

“The leadership and membership of your groups have been identified as probable users—and, therefore, as good testers—of AICHeExchange, as our bulletin board will be known. So, we hope that you will take time at the St. Louis meeting to alert your members to this new service, which will be accessible both by modem and Internet. We will provide you with complete connection information and log-in instructions in December.

“After you have had a chance to experiment with the service, we will also want your feedback on content, access, and other issues.

“Meanwhile, if you have any questions or suggestions, please “meet me in St. Louis,” or talk to the other members of our bulletin board team who will be on hand: Cindy Mascone, Diana McCauley, Marie Stewart, or Steve Smith. Of course, if it is more convenient, please call us in New York before or after the meeting.

“Thank you. We look forward to working with you on the testing of this exciting new service for our members.”

*Cruise down the information
superhighway.*

Get an Internet node.

Meetings and Conferences

To submit a paper for consideration at any event listed below, please contact the corresponding session chair or co-chair directly. For further information or details about each of the four CAST Division programming areas, contact the appropriate Area Chair as noted in the masthead. For general information concerning CAST Division sessions and scheduling, or to correct errors in this listing, please contact Jeffrey J. Sirola (CAST Division Programming Chair), Eastman Chemical Company, P.O. Box 1972, Kingsport, TN 37662-5150. Phone: 615-229-3069, Fax: 615-229-4558.

ESCAPE-4

Dublin, Ireland
March 28-30, 1994

The ESCAPE symposia series is organized periodically by the Computer Aided Process Engineering Working Party of the European Federation of Chemical Engineers. ESCAPE-4 will be held in Dublin, Ireland on March 28-30, 1994. ESCAPE-4 will give special emphasis to Aids for Process Operation (performance monitoring, production and maintenance planning, fault detection and analysis, and model-based control), Design for Production (reliability and availability analysis, safety, health, and environment, operability, synthesis of control networks and operating procedures, integrated studies of process and control systems, quality assurance), and Lessons learned from the application of Computer Aided Process Engineering techniques to industrial problems with stress on Process Systems. Additional information

about this conference may be obtained by contacting IChemE Conference Section (ESCAPE-4), 165-171 Railway Terrace, Rugby, Warwickshire CV21 3HQ, UNITED KINGDOM, 44-788-578214, 44-788-577182 (Fax).

Hyprotech Training Workshops

Houston, TX
Spring and Summer, 1994

The "*Overview of Hysim*" one-day workshops will be held on March 29, May 12, June 8, and July 19, 1994 in Houston, Texas. The "*Hysim Advanced Flowsheeting*" workshop will be held on May 10-11, 1994. The "*Simulating Non-Ideal Systems*" workshop will be held on June 6-7, 1994. Finally, the "*Simulation of Oil Refining Processes*" workshop will be held on July 20-22, 1994. Class size is limited, so please register early. For further details, contact Hyprotech, 10333 Richmond, Ste. 770, Houston, TX 77042. Phone: (713) 780-7087. Fax: (713) 780-7028.

1994 AIChE Spring National Meeting

Atlanta, Georgia
April 17-21, 1994

The CAST Division is sponsoring the following sessions at the Atlanta National Meeting.

18. Environmental Considerations for Process Simulation and Operations. Zitney/Diwekar (Tue PM)
19. Environmental Considerations for Process Simulation and Operations. Zitney/Diwekar (Wed AM)
33. Applications of Artificial Intelligence I: Presentations.

Ferrada/Davis/Venkatasubramanian (Wed AM)

34. Applications of Artificial Intelligence II: Demonstrations. Ferrada/Davis/Venkatasubramanian (Wed PM)
78. Model Predictive Control. Arkun/Schork (Mon AM)
79. Process Synthesis I. Achenie/Pistikopoulos (Mon PM)
80. Process Synthesis II. Achenie/Pistikopoulos (Tue AM)
81. Design and Analysis. Malone/Sirola (Tue PM)
82. Statistical Process Control. Moore/Williams (Wed AM)
83. Novel Applications in Process Control. Mijares/Withlow (Wed PM)
84. Empirical Process Modeling for Control. Harris/Rollins (Thu AM)
99. Modeling, Monitoring and Control in the Pulp and Paper Industries. Kayihan/Horton (Mon AM)
100. Advances in Process Operations: Industrial Success Stories. Kramer (Mon PM)
101. Data Analysis for Process Applications. Coon/Whiteley (Tue AM)
102. Enabling Technologies for Next Generation Process Simulators. Skjellum/Zitney (Tue PM)
103. Application of High Performance Computing in Chemical Process Engineering. Stadtherr/Skjellum (Wed AM)

Communicate with Vice President Al Gore on the superhighway.

Get an internet node.

Computer Integrated Manufacturing in Batch and Continuous Process Industries (CIMPRO '94)

**Rutgers University
New Brunswick, NJ
April 25-26, 1994**

Co-sponsored by CAST Division, IEEE, the Institute of Industrial Engineers, and the Society of Manufacturing Engineers.

The conference on Computer Integrated Manufacturing in the Process Industries will be held at Rutgers University on April 25-26, 1994. This conference is to be a forum for industrial managers and academic researchers to discuss advances in automation and computer integrated manufacturing that are being used, or could be used, in the batch and continuous process industries. Topics are expected to include Quality Control (automatic data acquisition, statistical process control, sensors, etc.), Production Control (hierarchical control, distributed control, Petri net modeling, planning and scheduling, inventory control, etc.), Factory Automation (real time process control, artificial intelligence, fuzzy logic control, neural nets, robotics and machine vision, etc.), Information Systems and Networks (CIM architectural design, database design, etc.), and Regulatory and Environmental Issues (software validation, process validation, impact of regulatory change, etc.). For further information, contact Department of Industrial Engineering at Rutgers University, 908-932-3654, cimpro@princess.rutgers.edu.

Modeling and Simulation

**Pittsburgh, PA
May 2-4, 1994**

Cosponsored by the International Association of Science and Technology

for Development (IASTED) and the International Society for Mini and Microcomputers (ISMM). The scope of this conference will include modeling, simulation, hardware, languages, numerical methods, analysis, neural networks, design, animation, visualization, multimedia, bond graphs, petri nets, stochastic processes, and parallel and distributed computing. The preregistration fee is expected to be approximately \$360, which covers registration, lunch on May 3, refreshments, and one volume of the proceedings. Authors will be requested to preregister. An author wishing to have his or her paper reviewed for possible publication in the International Journal of Modeling and Simulation, or any one of the other IASTED journals, should mail three copies of an extended version of the paper to the IASTED Secretariat in Anaheim, should indicate the journal of his or her choice, and should provide a maximum of five keywords describing the areas of the paper. For additional information contact IASTED Secretariat, 1811 West Katella Avenue Suite 101, Anaheim, CA 92814, Phone: 800-995-2161, Fax: 714-778-5463, Email: iasted@orion.oac.uci.edu.

Modeling, Simulation, and Control in the Process Industry

**Ottawa, Canada
May 25-27, 1994**

Cosponsored by the International Association of Science and Technology for Development (IASTED) and AIChE.

The purpose of this conference is to act as a forum for the interchange of information and experience between engineers, academics, researchers, and others interested in modeling, simulation, and control of industrial processes. The scope of the conference includes modeling, simulation, identification, control, stability, optimization, adaptive control,

predictive control, on-line digital control, multivariable control, control of distributed parameter systems, statistical process control, artificial intelligence applications, expert systems, fuzzy systems, neural networks, reliability and quality control, analysis, design, measurement, data acquisition, sensors, leak detection, and batch processes. The registration fee prior to March 1, 1994 is Can \$460 for member and Can \$500 for non-member; after this date, the fees are Can \$510 for member and Can \$550 for non-member. For further information contact Nadia Hamza, IASTED Secretariat, 80, 4500 16th Avenue N.W., Calgary, Alberta, CANADA, T3B 0M6, 403-247-6851 (Fax), iasted@istd.cuug.ab.ca.

ADCHEM '94

**Kyoto, Japan
May 25-27, 1994**

The ADCHEM '94 symposium will be held at the Kyoto Research Park during the week immediately preceding the PSE '94 conference in Kyongju, Korea. The symposium will focus on methodologies for advanced process control, particularly highlighting industrial experience and comparisons between theory and practice.

The main topics will include dynamic modeling and simulation, nonlinear model-based predictive control and optimization, statistical control techniques, and knowledge-based versus model-based control. For more information, contact the ADCHEM Secretariat, Department of Chemical Engineering, Kyoto University, Kyoto 606-01, JAPAN, 81-75-752-9639, a52165@jpnkudpc.bitnet.

**Fifth International
Symposium on Process
Systems Engineering
(PSE '94)**

**Kyongju, Korea
May 30 - June 3, 1994**

The International Programming Committee announces the Fifth International Symposium on Process Systems Engineering to be held May 30 - June 3, 1994 at Kyongju, Korea. The emphasis will be on the latest developments both in theories and practices in process systems technology as well as innovative approaches and applications in chemical process industries. Main themes of the conference will include process modeling simulation and optimization; process flowsheeting; process synthesis, integration, and design; process identification, dynamics, and control; batch process design and scheduling; advanced process control and on-line optimization; bioprocess systems engineering; artificial intelligence application in process engineering; process fault detection, diagnosis, and prevention; hazard analysis and reliability in chemical processes; engineering database management; interactions among process design, control, and operation; computer-aided engineering environment; computer integrated manufacturing in chemical process industries; applications in polymer and environmental processes; new technology in process systems engineering; marketing and operations; and a forum on education in process systems engineering. For further information, contact the Conference Secretariat, Professor En Sup Yoon, Department of Chemical Engineering, Seoul National University, Seoul 151-742, KOREA, 82-2-887-7232, 82-2-884-0530 (Fax), pslab@ibm3090.snu.ac.kr.

**Neural Networks in the
Process Industries
Special Sessions at World
Congress on Neural
Networks**

**San Diego, CA
June 5-9, 1994**

Cosponsored by CAST Division, IEEE, the Society of Manufacturing Engineers and the International Fuzzy Systems Association.

Two special sessions on neural networks in the process industries are planned for the World Congress on Neural Networks to be held in San Diego, from June 4 to 9, 1994. These sessions will explore applications of neural networks to all areas of the process industries, including process modeling, both steady state and dynamic, process control, fault detection, soft sensing, sensor validation, and business applications. Contributions from both industry and academia are solicited. Interested contributors should send a 500 word abstract to Prof. Thomas McAvoy, Dept. of Chemical Engineering, University of Maryland, College Park, MD, 20742 by Dec. 15, 1993. Phone: (301) 405-1939. Submission can also be made via e-mail mcavoy@eng.umd.edu, or by Fax: (301) 314-9126.

**IFAC Workshop on the
Integration of Process Design
and Control
IPDC '94**

**Baltimore, MD
June 27-28, 1994**

Co-sponsored by CAST Division.

Organized on behalf of the American Automatic Control Council by the Chemical Process Systems Laboratory, a constituent laboratory of the Institute for Systems Research, University of Maryland. Held in conjunction with the 1994 American

Control Conference, on the Monday and Tuesday of the week of the ACC.

Workshop Theme: The existence of interactions between the design of a process and that of its control system have been known to industrial practitioners for a long time. In the past decade academic research has produced methodologies and tools that begin to address the issue of designing processes that are flexible, can be controlled reliably, and are inherently safe. This Workshop brings together academics and practitioners with interests in the integration of process design and control, in order to examine the state of the art in methodologies and applications. The scope of the Workshop covers the design of chemical plants at different stages of detail. It also examines control issues from the plantwide level, where, for example, recycles between units can be important, to the specific unit level, where the availability or selection of measurements might be the most important factor.

Advance Program Summary:

Plenary talk: "Optimization as a Tool for Design/Control Integration," J. D. Perkins, Imperial College of Science, Technology and Medicine, U.K.
Invited presentation: "Industrial Viewpoint on Design/Control Tradeoffs," J. J. Downs et al., Eastman Chemical Company, U.S.A.

Sessions On: "Environments for Integrated Design and Control," "Process Controllability," "Effects of Uncertainty and Varying Operating Conditions on the Design/Control Interactions," "Integration of Design and Control for Distillation Systems," and "Case Studies," including Fluid Catalytic Cracking and Crystallization. There are no parallel sessions.

The advance registration fee is \$275, which includes the Workshop banquet on Monday, June 27, a copy of the Preprint volume and coffee breaks.

Registration will be handled through the 1994 American Control Conference. For further information please contact the Workshop's General Chair: Professor Evangelos Zafiriou, Institute for Systems Research, A V Williams Building, University of Maryland, College Park, MD 20742. Fax: +1-301-314-9920, E-mail: zafiriou@isr.umd.edu.

1994 American Control Conference

Baltimore, MD
June 29–July 1, 1994

Co-sponsored by CAST Division.

The American Automatic Control Council will hold the next American Control Conference June 29 - July 1, 1994 at the Stouffer Harborplace Hotel in Baltimore, Maryland. This conference will bring together people working in the fields of control, automation, and related areas from a number of societies. Both contributed and invited papers will be included in the program.

The CAST Division is sponsoring the following invited sessions.

1. Applications of Neural Networks and Fuzzy Logic to Chemical Processes (Fuentes/Rivera)
2. Control Relevant Instrumentation in Process Control (Wise/Moore)
3. Control Relevant Model Identification and Fault Detection (Braatz/Lee)
4. Multivariate Statistical Process Control (Ungar/Qin)
5. Biosystems Analysis and Control (Hensen/Doyle)
6. Modeling and Control in Microelectronics Processing (Badgwell/Bequette)
7. Synthesis of Decentralized Controllers (Manousiouthakis)

8. Batch Reactor Optimization and Control (Palanki/Vinson)

For more information contact James B. Rawlings, Department of Chemical Engineering, University of Texas, Austin, TX 78712-1062, 512-471-4417, 512-471-7060 (Fax), jbraw@che.utexas.edu.

Foundations of Computer-Aided Process Design (FOCAPD '94)

Snowmass Village, CO
July 10–15, 1994

Cosponsored by CAST Division and CACHE Corporation

Foundations of Computer Aided Process Design (FOCAPD '94) is the fourth international conference in this series designed to bring together engineers, scientists, and graduate students from universities, government laboratories, processing industries, and computer technology companies to assess and critique the current status and future directions of computer-aided process and product engineering. Because of heightened competitiveness and awareness of tightly coupled aspects of the chemical processing industries, the focus of this conference will be on interaction and integration of process concepts, methodologies, and technologies.

The conference will consist of nine sessions:

Session 1: Impact of Global Economy on New Directions for the Competitiveness of the Chemical Industry.

Session 2: Separation System Synthesis and Design

"Separation System Synthesis for Nonideal Liquid Mixtures" (Malone and Doherty)

"Modeling and Analysis of Multicomponent Separation Processes" (Taylor and Lucia)

"Design of Adsorption and Membrane Processes for Bulk Gas Separation" (Ruthven and Sircar)

Session 3: Reactor System Synthesis and Design

"Design of Reaction Paths" (Mavrovouniotis and Bonvin)

"Synthesis of Reactor Networks" (Hildebrandt and Biegler)

Session 4: Green Trends in Design

"Process Design for Waste Minimization" (Allen and Manousiouthakis)

"Design for Process Safety" (Powers and Fusillo)

"Process and Product Design for the Life Cycle" (Boustead)

Session 5: Design for Operations and Control

"Design for Operations" (Morari and Perkins)

"Design for Control and Operability: An Industrial Perspective" (Downs and Ogunnaike)

Session 6: Process Simulation Environments and Tools

"Multipurpose Simulation and Optimization" (Pantelides and Britt)

"Process Engineering Databases—from the PDXI Perspective" (Motard and Blaha)

"Management and Design Process" (Westerberg and Robertson)

Session 7: Methods Driven by Advanced Computing Environments

"The Application of Optimization Techniques to Aerospace Systems" (Betts)

"Simulated Annealing as a Design Tool" (Kirkpatrick)

Session 8: Contributed Paper Session

Session 9: Integrating Design Criteria, Subsystems, and Tools

"Hierarchical Approaches in the Conceptual Design of Chemical and Biochemical Processes: Framework and Computer-Aided Implementation" (Douglas and Stephanopoulos)

"Algorithmic Approaches in Process Synthesis: Logic and Global Optimization" (Grossmann and Floudas)

"Industrial Perspective on Process Synthesis" (Sirola)

To promote maximum interactions, the total conference attendance will be limited. Selection will be made depending on the level of involvement of the applicant in computer-aided design. You must have applied for attendance by January 15, 1994. Applicants will be notified by March 15, 1994 of their acceptance for the conference.

Location of the Conference: The conference will be held at the Silvertree Hotel in Snowmass, CO. Accommodations include reasonably priced hotel rooms, condominiums, and studios. To promote interaction, the conference will arrange for common breakfast and dinner service for participants and guests. Details of these conference costs will be provided upon receipt of the application form.

Conference Program: There will be nine sessions including the opening keynote address on Sunday. Sessions will be scheduled mornings and evenings with afternoons free. No session will be held Thursday evening which is reserved for the banquet and the conference will close Friday at noon. In contrast to previous FOCAPD conferences, the program has more of a process orientation with the overall goal of integrating process objectives, subsystems, and tools.

In particular, a session will be made up of short contributed papers in diverse aspects of computer aided process design. Included among topics will be methods for process simulation and optimization, process synthesis strategies, process analysis and evaluation for downstream concerns, and the application of qualitative modeling derived from artificial intelligence and logic-based programming. The format of this session will be as a poster session with time periods allotted for summary presentations. The deadline for submission of 500 word abstracts for this session was December 15, 1993. Submissions were made directly to the session chair, Prof. G. V. Reklaitis, School of Chemical Engineering, Purdue University, West Lafayette, IN 47907.

Application for FOCAPD '94

Conference: Attendance at FOCAPD '94 will be limited and is by invitation based on this application. You will be notified by March 15, 1994 whether or not you have been selected to attend the conference. The conference fee of \$675 will cover registration, a copy of the proceedings, the opening reception, and the banquet.

For more information about the conference, contact Michael F. Doherty (Conference Chair), Department of Chemical Engineering, University of Massachusetts, Amherst, MA 01003-0011, 413-545-2359, 413-545-1647 (Fax), mdoherty@ecs.umass.edu or Lorenz T. Biegler (Conference Vice Chair), Department of Chemical Engineering, Carnegie Mellon University, Pittsburgh, PA 15213-3890, 412-268-2232, 412-268-7139 (Fax), d101lb01@vb.cc.cmu.edu. To inquire about attendance, contact David M. Himmelblau, CACHE Corporation, P.O. Box 7939, Austin, TX 78713-7939 immediately.

1994 Gordon Research Conference on Statistics in Chemistry and Chemical Engineering

New Hampton School
New Hampton, NH
July 31-August 5, 1994

Chair: Svante Wold, Ume University

Vice Chair: Barry M. Wise, Pacific Northwest Laboratory

1. **Speaker:** George E.P. Box, Center for Quality and Productivity Improvement

Topic: The disastrous effect of mathematical leadership on statistics: Scientific thinking must drive our subject

Discussant: Gerald J. Hahn, General Electric Control Research and Development

Moderator: William J. Hill, Allied Signal

2. **Speaker:** Paige Miller and Ron Swanson, Eastman Kodak

Topic: Multivariate process modeling and design

Discussant: David W. Bacon, Queen's University, Canada

Moderator: Soren Bisgaard, Center for Quality and Productivity Improvement

3. **Speaker:** Lennart Ljung, Linköping University, Sweden

Topic: System identification: Modeling and parameter estimation from a control perspective

Discussant: John F. MacGregor, McMaster University

Moderator: Daniel Rivera, Arizona State University

4. **Speaker:** Dora Schnur, Monsanto Agricultural Co.

Topic: Design of series of molecules

Discussant: S. Stanley Young, Glaxo, Inc.

Moderator: David L. Duewer, National Institute of Standards and Technology

5. **Speaker:** Veli-Matti Taavitsainen, Kemira Oy, Espoo Research Center, Finland

Topic: Non-linear modeling with latent variables

Discussant: Mervyn Stone, University College, London

Moderator: Tom MacAvoy, University of Maryland

6. **Speaker:** Eugene Sanchez, Mobil Research and Development

Topic: Recalibration of on-line instruments

Discussant: Clifford H. Spiegelman, Texas A&M University

Moderator: Ernie H. Baughman, AMOCO Corp.

7. **Speaker:** Dennis K.J. Lin, IBM

Topic: Supersaturated designs

Discussant: Nouna Kettaneh, MDS Inc.

Moderator: Peter W.M. John, University of Texas at Austin

8. **Speaker:** David Weiniger, Daylight Chemical Info Systems

Topic: Molecular discovery by genetic algorithms

Discussant: Bruce Wilson, Eastman Chemical Co.

Moderator: Sharon Neal, University of California at Riverside

9. **Speaker:** Aloke Phatak, CSIRO, Australia, and Chuck Heckler, Eastman Kodak

Topic: The latent variable in science and technology

Discussant: Mary Beth Seasholtz, Dow

Moderator: Barry M. Wise, Pacific Northwest Laboratory

For applications to attend the conference contact: Dr. A.M. Cruickshank, Gordon Research Conferences, University of Rhode Island, Kingston, RI 02881; (401)783-4011, bcp@uriacc.bitnet. To submit abstracts for poster session papers, contact: Barry M. Wise, Pacific Northwest Laboratory, P.O. Box 999, Richland WA, 99352, bm_wise@pnl.gov. For further information on other aspects of the conference, contact: Svante Wold, 371 Highland Ave, Winchester, MA 01890, Fax: (617)721-2652.

Grants to GRC For Beginning Researchers Offered. Through a generous donation from the Statistics Division of the American Society for Quality Control, six grants are available to pay for registration, lodging, and food for beginning researchers to attend the 1994 Gordon Research conference on Statistics in Chemistry and Chemical Engineering (usual cost is \$390). Grant recipients will be responsible for their own travel expenses. These grants are available to individuals who have received their highest degree since May 1991 or who are still in school and who are involved in research in statistics, chemistry, or chemical engineering. Applications should consist of a letter of interest, a resume, a letter of recommendation from a major professor, research supervisor, or colleague familiar with the applicant's research record, and an abstract of the research to be presented in the conference poster session.

For consideration at the first decision point, applications must be received by the conference Vice Chair by May 15, 1994. Please send applications (4 copies) for these grants to Barry M.

Wise, Pacific Northwest Laboratory, P.O. Box 999, Richland WA, 99352 (bm_wise@pnl.gov) with a copy to the conference chair: Svante Wold, 371 Highland Ave, Winchester, MA 01890. Applicants must also apply directly to the conference itself by contacting: Dr. A.M. Cruickshank, Gordon Research Conferences, University of Rhode Island, Kingston RI 02881; (401)783-4011 (bcp101@uriacc.bitnet).

IFAC Workshop on Computer Software Structures: Integrating Artificial Intelligence / Knowledge Based Systems in Process Control

**Lund, Sweden
August 10-12, 1994**

The aim of the workshop is to inform participants about (a) where the leading edge is in the integration of AI/KBS systems in real time process control, (b) what the primary challenges are to future advances, and (c) how computer science, process control, and related technologies can contribute to these advances.

The development of artificial intelligence and knowledge-based systems has created a strong interest in applying these technologies to process control. This workshop will discuss where the leading edge is in the integration of these systems in real time process control, the primary challenges to future advances, and the contribution of computer science, process control, and related technologies to these advances. The workshop will focus on solutions that meet the needs of real-time operations, data synchronization, and execution speed while satisfying control systems functionality and integration constraints.

The topics will include the role of AI/KB systems in the supervision, management, and control of industrial

processes; software architectures and languages for joint applications of expert systems and process control algorithms, possibly high performance and time-critical; synchronous communication and real time needs in control systems incorporating AI/KBS; object-oriented structures and AI/KBS structures versus traditional software systems in process control; issues in hardware and software integration; software techniques that accommodate changes in process configuration, issues in knowledge acquisition and representation for process control; augmenting human decision making; the hardware technology base for integrated systems including neural networks and other new avenues; management issues of cost, economy, implementation, and project management; and process control applications of real time expert systems, neural networks, and fuzzy logic.

Sponsored by: IFAC Technical Committee on Applications. Co-sponsored by: IFAC Technical Committee on Computers, IEEE Control Society, and SAIS Swedish AI Society.

Key Dates:

Submission of draft papers: January 15, 1994.

Notification of acceptance: March 15, 1994.

Submission of full papers: June 1, 1994.

The Workshop language is English. All submissions must be written in English. Send three copies of the draft papers. (max. 6 pages double columns).

Location: The Workshop will take place in the Palaestra building in the university area in the center of the old university town Lund. Lund is located in the southern part of Sweden and has good international flight connections via Copenhagen and/or Malmö. An

exhibition will be arranged in connection with the Workshop.

Publication and Copyright: Only unpublished papers may be submitted. IFAC holds the copyright for publication of the papers. Accepted papers will appear in the Preprints and will be considered for possible publication in the IFAC Journals *Automatica* or *Control Engineering Practice* published by Pergamon Press. A paper will be released for (re)publication three months after the symposium unless the author has been notified that the paper is being considered for publication in either of the IFAC Journals. The abstract of all presented papers will be published in the IFAC Journal *Control Engineering Practice*.

Copyright of articles are transferred to IFAC on presentation at the meeting. Permission to republish material presented at the meeting should be sought from the IFAC Publications Office, Pergamon Press in Oxford, UK. Permission to republish from *Automatica* and *Control Engineering Practice* should be sought from the Rights and Permissions Manager, Pergamon Press in Oxford, UK. Please also note that the papers cannot be published unless they have been released from all patent and proprietary restrictions.

For additional information, contact the conference secretary Ms. Eva Dagnegård, Department of Automatic Control, Lund University of Technology, P.O. Box 118, S-221 00 Lund, SWEDEN, +46-46-108787, +46-46-138118 (Fax), ifac@control.lth.se.

The Third IEEE Conference on Control Applications

Glasgow, Scotland
August 24-26, 1994

The third IEEE Conference on Control Applications (CCA '94) will be held at

the University of Strathclyde in Glasgow on August 24-26, 1994. This is the first time the conference will be outside of North America. Focus will be on industrial applications, particularly in the process, manufacturing, energy, brewing, aerospace, marine, and high technology semiconductor industries. Topics will include adaptive control, aerospace systems, automotive systems, biomedical systems, computer-aided design, expert systems, fault detection, fuzzy systems, manufacturing systems, man-machine interfaces, modeling and identification, nonlinear systems, intelligent control, power systems, process control, robust control, robotics, and smart structures.

Technical Program: In accordance with the theme of the conference papers, presenting original work in all aspects of control applications and control technology are invited. Papers describing industrial applications and with industrial contributions are particularly encouraged. Because of the Conference location applications in the process, manufacturing, energy, brewing, aerospace, marine, and high technology semiconductor industries are welcome. Topics for the regular sessions include, but are not limited to:

Adaptive control, Fault detection, Intelligent control, Aerospace systems, Fuzzy systems, Power systems, Automotive systems, Manufacturing systems, Process control, Biomedical systems, Man/Machine interface, Robust control, Computer-aided design, Modeling and Identification, Robotics, Expert Systems, Nonlinear systems, Smart Structures

Authors of Regular Papers will be requested to keep their manuscripts to six Proceeding pages of IEEE conference format or less (about 6000 words). Brief Paper will be limited to two Proceeding pages (about 2000 words). There will be a mandatory page charge for each additional page. Authors of accepted papers are expected to attend

the Conference to present their work. Each paper must be headed with paper title, the names, affiliations, and complete mailing addresses of all authors, and the statement "3rd IEEE-CCA." The first named author will be used for all correspondence unless otherwise requested.

Conference Registration: One author of each accepted paper will be expected to pre-register their attendance at the Conference when the finalized manuscript is submitted. A number of reduced IEEE Student member registration fees will be available and the Organizing Committee would like to encourage a good representation from Student Members.

For further information, contact the general chairman, Professor Mike Grimbale, Industrial Control Centre, University of Strathclyde, Glasgow G1 1QE, SCOTLAND, +44-41-552-4400 x-2378, +44-41-553-1232 (Fax), system@icu.strath.ac.uk.

The 3rd CCA International Programme Committee invites the authors to submit 5 copies of complete manuscripts of regular and brief papers. The manuscript should be sent to: Professor Heinz Unbehauen, Ruhr-Universität Bochum, Lehrstuhl für Elektrische Steuerung und Regelung, Postfach 102148, 4630 Bochum 1, Germany. Phone: +49 234 700 4071, Fax: +49 234 709 4101, E-mail: office@esr.ruhr-uni-bochum.de.

Deadlines for Regular/Brief Papers:

Manuscripts are due by: January 5, 1994

Notification of Acceptance: March 31, 1994

Camera-Ready Manuscripts by: May 31, 1994

Conference Events: An important part of any Conference is the opportunity to meet with colleagues

and discuss topics of common interest. The Conference will have several social events to assist the dialogue. We have been fortunate to obtain sponsorship from the Glasgow Development Agency and the Civic Reception will now be held at the Burrell Collection Art Gallery in Pollok Park. This will be a unique opportunity to combine cultural, social, and control interests. The Conference Banquet has been arranged for Thursday August 25th and will be in the Strathclyde Suite of the New Royal Concert Hall. Professor Alistair MacFarlane, CBE, is our distinguished speaker for the evening.

Workshops: The Conference will be preceded by two days of workshops on August 22nd and 23rd, 1994. These tutorial workshops will be held to encourage interaction between theoretical and applied researchers and industrial practitioners. Although the timetable is not finalized, the four Workshops are:

1. The Theory and Applications of Dynamic Matrix Control

Organizer: Steve Williams, Cambridge Control Ltd, U.K.

2. Practical Aspects of System Identification

Organizer: Ioan Landau, Laboratoire d'Automatique de Grenoble, France.

3. Modeling, Simulation, and Control of Power Generation Systems

Organizers: Colin Cloughley, John Brown Engineering plc.; Roger Farnham, Scottish Power plc.; Prof Michael Grimbale, Strathclyde University, Glasgow.

4. Genetic Algorithms: Theory and Control Applications

Organizer: Prof Krishna Kumar, University of Alabama, Alabama, U.S.A.

For further information contact: Dr. Reza Katebi, Industrial Control Centre, University of Strathclyde, Glasgow, G1 1QE, U.K.; Phone: +44-41-552-4400 Ext: 4297, E-mail: system@icu.strath.ac.uk; Fax: +44-41-553-1232.

IFAC Symposium on Robust Control Design

**Rio de Janeiro, Brazil
September 14-16, 1994**

Topics for this symposium include linear control system design, nonlinear control systems, adaptive and variable structure control, LQG, LTR, and LMI design, uncertain systems analysis and control, stability, structured-unstructured parameter perturbations, large-scale control systems, hierarchical and decentralized control, and mathematical control and systems theory. For additional information, contact J. C. Geromel, Chairman of the IPC, LAC-DT-Fee/UNICAMP, C.P. 6101, 13.081-970 Campinas, S.P., BRAZIL, 55-192-391395 (Fax).

First International Chemometrics InterNet Conference (InCINC '94)

September 26–November 18, 1994

Second Announcement and Call For Papers.

The North American Chapter of the International Chemometrics Society (NAMICS) is sponsoring InCINC'94, the First International Chemometrics InterNet Conference. This on-line conference will be held September 26 to November 18, 1994. Papers will be submitted electronically and downloaded over the network by conference participants. Organized

discussion periods will follow over the Internet.

There will be ten sessions at InCINC'94. The session titles and chairs are listed below. Five sessions will be run in parallel and participants may subscribe to any of the current sessions. Each session will include four papers, which will be discussed for one week each. Session chairs will moderate the discussion of the papers. A special issue of Chemometrics and Intelligent Laboratory Systems will be published with the conference papers and summaries of the discussions.

InCINC'94 Important Dates:

Submit abstracts to session chair and conference chair: 2/25/94

Author's notified of preliminary acceptance: 3/18/94

Final manuscripts due to session chairs: 7/29/94

Registration begins: 8/15/94

Manuscripts available at selected ftp site: 9/09/94

Registration packets mailed to participants: 9/12/94

Conference sessions 1-5: 9/26 - 10/21/94

Conference sessions 6-10: 10/24 - 11/18/94

Informal discussion period: 11/28 - 12/02/94

Abstracts should be 300-500 words and should be submitted electronically in ASCII text format (or any other agreed upon format) to the session chair and to the conference chair. Directions and permissible formats for submission of final documents will be given later, however it is expected that the conference will support a wide variety of the popular word processing formats and platforms. Papers will be available to participants in several formats including a multi-platform document interchange format (several formats are currently under

evaluation), the native document format and ASCII text with no figures. Hard copies of the papers will be provided at an additional charge.

The optional registration fee of \$30 will include a certificate of participation, a copy of the final proceedings as published by Chemometrics and Intelligent Laboratory Systems, and a diskette with copy of the document file viewing program required for reading the conference papers with embedded graphics.

For further information, please contact the Conference Chair. InCINC'94 Chairs and Sessions:

Conference Chair: Barry M. Wise
(bm_wise@pnl.gov)

Conference Co-chair: Charles Lochmuller
(clochmul@ult1.chem.duke.edu)

Session 1 – Chemometrics and Education: Bruce Wilson
(bewilson@kodak.com or
usechx3k@ibmmail.com)

Session 2 – Chemometrics:
Philosophy, History, and Directions:
Aloke Phatak
(alokep@syd.dms.csiro.au)

Session 3 – Data
Rectification/Validation: David Himmelblau
(twk@faulty.che.utexas.edu or
chnn414@utxvm.cc.utexas.edu)

Session 4 – Chemometrics in Dynamic Systems: Ali Cinar
(checinar@minna.acc.iit.edu)

Session 5 – Non-linear Alternatives to Neural Networks: Lyle Ungar
(ungar@central.cis.upenn.edu)

Session 6 – Speculative (Half-Baked) Ideas for Future Research: Dave Duewer
(dlduewer@enh.nist.gov)

Session 7 – Data Filtering and Compression: Mike Whitbeck

Session 8 – QSAR/Chemometrics in Molecular Modeling: Dora Schnur
(dmschn@bb1t.monsanto.com)

Session 9 – Detection of Process Shifts: Jim Pollard
(pollard@shell.com)

Session 10 – Second Order Methods: Age Smilde
(asmilde@anal.chem.uva.nl)

1994 AIChE Annual Meeting

**San Francisco, CA
November 13-18, 1994**

Meeting Program Chair: Peter Van Opdorp, UOP, 25 E. Algonquin Road, Des Plaines, IL 60017, 708-391-3588, 708-391-3737 (Fax).

The CAST Division is planning the following sessions at the San Francisco Annual Meeting which have been approved by the Meeting Program Chair. A final call for papers for this meeting appears later in this issue. Deadline for submission of abstracts is March 1, 1994.

Area 10a: Systems and Process Design

1. Design and Analysis. Michael L. Mavrovouniotis, Northwestern University (Chair) and Heinz A. Preisig, University of New South Wales (Co-Chair).
2. Process Synthesis. Amy R. Ciric, University of Cincinnati (Chair) and Vivek Julka, Union Carbide Corporation (Co-Chair).

Joint Area 10a and Area 10b Session

1. Design and Control. Babu Joseph, Washington University (Chair) and Jean-Paul Calvet,

Koninklijke/Shell-Laboratorium
(Co-Chair).

Joint Area 10a and Area 10c Session

1. High Performance Computing in Computer Process Design. Donald L. Miller, E. I. du Pont de Nemours & Company (Chair) and Mark A. Stadtherr, University of Illinois (Co-Chair).

Joint Area 10a and Area 8e Session

1. Process Simulation in Integrated Circuit Manufacturing. Thomas A. Badgwell, Rice University (Chair) and Luke Achenie, University of Connecticut (Co-Chair).

Joint Area 10a and Area 15c Session

1. Modeling, Simulation, and Computer-Aided Bioprocess Design. James G. Stramondo, BioProcess Modeling Designs (Chair) and Demetri Petrides, New Jersey Institute of Technology (Co-Chair).

Area 10b: Systems and Process Control

1. Advances in Process Control. Bradley R. Holt, University of Washington (Chair) and Francis J. Doyle, Purdue University (Co-Chair).
2. Nonlinear Control. B. Wayne Bequette, Rensselaer Polytechnic Institute (Chair) and Prodromos Daoutidis, University of Minnesota (Co-Chair).
3. Model Predictive Control. Jay H. Lee, Auburn University (Chair) and Evelio Hernandez, Shell Development Company (Co-Chair).
4. Model Identification and Estimation for Process Control. Paul H. Gusciora, Chevron Research and Technology Company (Chair) and Oscar D.

Crisalle, University of Florida (Co-Chair).

5. Plant-Wide Control. William L. Luyben, Lehigh University (Chair) and Michael Nikolau, Texas A&M University (Co-Chair).
6. Recent Developments in Modeling, Optimization, Computation, Monitoring, and Control [POSTER SESSION]. Thomas J. McAvoy, University of Maryland (Chair), Manfred Morari, California Institute of Technology (Co-Chair), Michael J. Henson, E. I. du Pont de Nemours & Company (Co-Chair), and Anthony Skjellum, Mississippi State University (Co-Chair).

Joint Area 10b and Area 10c Sessions

1. Statistics and Quality Control. Richard S. H. Mah, Northwestern University, (Chair) and George N. Charos, Amoco Research Center (Co-Chair).
2. Process Operations and Fault-Tolerant Control. Karlene A. Kosanovich, E. I. du Pont de Nemours & Company (Chair) and Sandro Macchietto, Imperial College (Co-Chair).

Joint Area 10b and Area 8e Session

1. Process Control in Electronic Materials Processing. Thomas F. Edgar, University of Texas (Chair).

Joint Area 10b and Area 15c Session

1. Biosensors and Bioprocess Control. M. N. Karim, Colorado State University (Chair) and Janice A. Phillips, Lehigh University (Co-Chair).

Area 10c: Computers in Operations and Information Processing

1. Advances in Optimization. Ignacio E. Grossmann, Carnegie Mellon University (Chair) and Mahmoud

El-Halwagi, Auburn University (Co-Chair).

2. Data Interpretation. James F. Davis, Ohio State University (Chair) and James F. Pollard, Shell Development Company (Co-Chair).
3. Intelligent Manufacturing Systems. (Cosponsored by the International Cooperation Committee of the Society of Chemical Engineers, Japan) Iori Hashimoto, Kyoto University (Chair) and Venkat Venkatasubramanian, Purdue University (Co-Chair).

Area 10d: Applied Mathematics and Numerical Analysis

1. Engineering Applications of Chaos and Fractals. Fernando J. Muzzio, Rutgers, The State University of New Jersey (Chair) and Ken Leong, Raychem Corporation (Co-Chair).
2. Computational Integral and Spectral Methods in Chemical Engineering Applications. Pedro Arce, FAMU/FSU (Chair) and Marios Avgousti, Stevens Institute of Technology (Co-Chair).
3. Nonlinear Dynamics and Pattern Formation. Hsueh-Chia Chang, University of Notre Dame (Chair) and Vemuri Balakotaiah, University of Houston (Co-Chair).
4. Probabilistic Models. D. Ramkrishna, Purdue University (Chair) and Kyriacos Zygourakis, Rice University (Co-Chair).

In addition, CAST plans to again cosponsor Educational Computer Software demonstrations throughout the Annual Meeting.

1995 AIChE Spring National Meeting

Houston, TX
March 19-23, 1995

Meeting Program Chair: Chen-Hwa Chiu, Bechtel Corporation, 3000 Post Oak Road, P.O. Box 2166, Houston, TX 77252-2166.

The CAST Division is planning the following tentative program at the Houston National Meeting. AIChE and the Meeting Program Chair will finalize the sessions at the 1994 Programming Retreat in February, and any corrections will appear in the next issue of CAST Communications. A first call for papers for this meeting appears later in this issue. Deadline for submission of abstracts is September 1, 1994.

Area 10a: Systems and Process Design

1. Design and Analysis. Antonis C. Kokossis, University of Manchester Institute of Science and Technology (Chair) and Karen A. High, Oklahoma State University (Co-Chair).
2. Process Synthesis. Oliver M. Wahnschafft, Aspen Technology Inc. (Chair) and Urmila M. Diwekar, Carnegie Mellon University (Co-Chair).
3. Batch Process Design and Scheduling. Iftekhar A. Karimi, E. I. du Pont de Nemours & Company (Chair) and Urmila M. Diwekar, Carnegie Mellon University (Co-Chair).
4. Design for Waste Minimization. Mahmoud El-Halwagi, Auburn University (Chair) and Antonis C. Kokossis, University of Manchester Institute of Science and Technology (Co-Chair).
5. Electronic Process Data Exchange – Tutorial Review of the PDXI Project. Neil L. Book, University of Missouri – Rolla (Chair) and

Rudolphe L. Motard, Washington University (Co-Chair).

Joint Area 10a and Area 10c Session

1. Emerging Technologies in Process Design and Synthesis. Luke E. K. Achenie, University of Connecticut (Chair) and Anthony Skjellum, Mississippi State University (Co-Chair).

Area 10b: Systems and Process Control

1. Economic Benefits of Process Control. Brian Ramaker, Shell Development Company (Chair) and Jack Williams, Shell Development Company (Co-Chair).
2. Novel Applications in Process Control. Andrew E. Farell, University of South Carolina (Chair) and Eugene Boe, Profimatics, Inc. (Co-Chair).
3. Applications of Statistics in Process Control. Derrick J. Kozub, Shell Development Company (Chair) and S. Joe Qin, Fisher-Rosemont Systems (Co-Chair).
4. Control Strategies and Integration of Design and Control. Michael Nikolau, Texas A&M University (Chair) and Randel M. Price, Univ. of Mississippi (Co-Chair).

Area 10c: Computers in Operations and Information Processing

1. Developments in Supply Chain Design and Optimization. Gary E. Blau, DowElanco (Chair) and Joseph F. Pekny, Purdue University (Co-Chair).
2. Process Systems Engineering for Environmental Applications. Stephen E. Zitney, Cray Research Inc. (Chair) and Karen A. High, Oklahoma State University (Co-Chair).
3. Process Operator Training. John C. Hale, E. I. du Pont de Nemours & Company (Co-Chair) and Paul I.

Barton, Massachusetts Institute of Technology (Co-Chair).

DYCORD+'95

Helsingor, Denmark
June 7-9, 1995

DYCORD+'95 (Dynamics and Control of Reactors, Distillation Columns, and Batch Processes) will be held June 7-9, 1995 in Helsingor, Denmark. For further information on this meeting, contact the international program committee chair James B. Rawlings, Department of Chemical Engineering, University of Texas, Austin, TX 78712-1062, 512-471-4417, 512-471-7060 (Fax), jbraw@che.utexas.edu.

ESCAPE-5

Bled, Slovenia
June 11-14, 1995

The ESCAPE symposia series is organized annually by the Computer Aided Process Engineering Working Party of the European Federation of Chemical Engineers. ESCAPE-5 will be held in Bled, Slovenia on June 11-14, 1995. ESCAPE-5 will give special emphasis to process synthesis, integration, design, and retrofit; process flowsheeting, simulation, optimization, and process data estimation, reconciliation, and management; process dynamics, safety, and control; process operation, economics, and computer integrated manufacturing; computing, graphics, and numerical methods; and expert systems, artificial intelligence, logic, and neural networks in process systems engineering. Deadlines for abstracts is April 30, 1994. For more information, contact the conference secretariat at Kemijska Tehnologoja, Tehniska Fakulteta, P.O. Box 224, SLO-62001 Maribor, SLOVENIA.

1995 American Control Conference

Seattle, Washington
June 21-23, 1995

Cosponsored by CAST Division.

The American Control Conference (ACC), held in cooperation with IFAC and co-sponsored by the AIChE (as a member society of the AACC), brings together people from all areas of control and automation. Topics of interest include but are not limited to: robotics, manufacturing, guidance, and flight control, power systems, process control, measurement and sensing, identification and estimation, signal processing, modeling and advanced simulation, fault detection, model validation, multivariable control, adaptive and optimal control, robustness issues, intelligent control, expert systems, neural nets, industrial applications, and control education.

Call for Contributed Papers

Prospective authors of regular papers (5 pages in Proceedings) should submit six copies of the complete manuscript (marked "1995 ACC") to your Society Review Chair by September 15, 1994. At the author's request, regular papers will be considered for publication in your society's journal provided the submission rules for the journal are followed. Short papers (2 pages in Proceedings) consisting of a 3-4 page summary should be submitted to the Program Vice-Chair for Contributed Sessions by September 15, 1994. The author's society affiliation, if any, should be indicated on the short paper summary, along with a list of keywords. All papers accepted for presentation must appear in the Conference Proceedings.

Call for Invited Sessions

The Program Committee is also soliciting proposals for invited sessions for the conference. Prospective organizers should contact the Program

Vice-Chair for Invited Sessions before August 15, 1994 for the appropriate forms. The completed forms must be returned to him by September 15, 1994.

ACC Workshops

The Organizing Committee intends to arrange tutorial workshops to be held in conjunction with the 1995 ACC. Suggestions are solicited for appropriate subjects. Potential organizers should contact the Workshop Chair.

Student Best Paper Award

Primary and first-listed authors of regular papers who are students at the time of submission can apply for this award. Up to five finalists will be chosen based on the written paper and will be awarded limited travel grants to attend the conference. The final selection will be made at the conference and will be based on both the written paper and the student's presentation. The winner will receive a plaque at the closing reception. To apply, submit your paper through the regular procedure. Then send a copy of the paper together with a cover letter from your major professor (advisor), to the Program Chair. The letter should be on University letterhead and should certify that the eligibility conditions are satisfied. The deadline for application is the same as the deadline for submission of regular papers.

General Chair

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Vice-Chair for Contributed Sessions

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*Have a topic for programming?
Contact area chairs or vice
chairs.*

*Addresses and phones on
inside front page of CAST
Communications.*

Intelligent Systems in Process Engineering (ISPE '95)

Summer 1995

Cosponsored by CAST Division and
CACHE Corporation.

The first International Conference on Intelligent Systems in Process Engineering is tentatively scheduled for July 9-14, 1995 in the Inter-mountain West. The objectives of this conference are to present an overview of the state of the art of intelligent systems theory and practice in process engineering, to discuss the impact of intelligent systems applications in several process industries, to examine emerging trends in intelligent systems applications, to provide a forum for in-depth discussions between university researchers and industrial practitioners on the practical challenges in developing and applying intelligent systems, and to develop a better understanding of the tools available through demonstrations to stimulate wider implementation of intelligent systems. Specific topical areas are expected to include design and synthesis, fault diagnosis, process modeling and control, supervisory control, optimization, scheduling and planning, operator training, and process safety and hazard analysis.

The conference is being organized by George Stephanopoulos, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, 617-253-3904, 617-253-9695 (Fax), geosteph@fungus.mit.edu, Venkat Venkatasubramanian, School of Chemical Engineering, Purdue University, West Lafayette, IN 47907-1283, 317-494-0734, 317-494-0805 (Fax), venkat@ecn.purdue.edu; and James F. Davis, Department of Chemical Engineering, Ohio State University, Columbus, OH 43210-1180, 614-292-0090, 614-292-3769 (Fax), davis@kcgl1.eng.ohio-state.edu.

1995 AIChE Annual Meeting

**Miami Beach, FL
November 12-17, 1995**

Meeting Program Chair: Tim Anderson, Department of Chemical Engineering, University of Florida, Gainesville, FL 32611.

The CAST Division is considering the following programming topics for the Miami Beach Annual Meeting. AIChE and the Meeting Programming Chair will finalize the sessions at the 1994 Programming Retreat in February, and the approved program will appear in the next issue of CAST Communications. Deadline for submission of abstracts will be March 1, 1995.

New Topics in Process Synthesis (Ka Ng and Richard Colberg).

Advances in Process Synthesis (Oliver Wahnschafft and Urmila Diwekar).

Design and Analysis (Vivek Julka and Stratos Pistikopoulos).

Advances in Process Design (Mahmoud El-Halwagi and Ami Ciric).

High Performance Computing for Systems Engineering (Antonios Kokossis and Erik Ydstie) [Joint with Area 10d.]

Advances in Process Control.

Nonlinear Process Control.

Model Predictive Control.

Control System Performance Monitoring and Diagnosis.

Control Relevant Identification and Estimation.

Batch Process Modeling, Monitoring, and Control.

Issues in On-Line Optimization for Control.

Intelligent Manufacturing Systems.

Planning and Scheduling.

Computing for Plant Operations.

High Performance Computing for Process Engineering.

Spatio-temporal Patterns: Experiments and Modeling.

Parallel Computing Applications in Chemical Engineering.

Chemical Engineering Applications of Stochastic Processes.

Numerical Issues in Fluid Mechanics, Transport, and Materials Processing.

Biochemical and Biomedical Modeling Issues.

Advances in Computing and Systems Technology.

In addition, CAST plans to again cosponsor Educational Computer Software demonstrations throughout the Annual Meeting.

Computer Process Control V (CPC-V)

Winter 1996

Cosponsored by CAST Division and
CACHE Corporation

The fifth Chemical Process Control Conference is tentatively scheduled for early winter, 1996. In the tradition of previous conferences in this series, CPC-V will focus on advances that have taken place recently in the process control field. These will be put in perspective, used to define practical needs and intellectual challenges in the area, and to help narrow the gap between process control theory and

application. The organizers of this conference will be Jeffrey C. Kantor, Department of Chemical Engineering, University of Notre Dame, Notre Dame, IN 46556, 219-631-5797, 219-631-8366 (Fax), jeffrey.kantor@nd.edu; and Carlos Garcia, Shell Development Company, P.O. Box 1380, Houston, TX 77001.

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Call For Papers

**Final Call for CAST Sessions
1994 AIChE Annual Meeting
San Francisco, CA, November 13-18, 1994**

The names, addresses, and telephone numbers of the session chairs are given on the next several pages, as are brief statements of the topics to receive special emphasis in selecting manuscripts for these sessions. Prospective session participants are encouraged to observe the following deadlines which have been established, but may be changed, by the Meeting Program Chair.

Special Note to Authors Submitting Abstracts for Annual Meeting

Sessions Sponsored by CAST:

Because of the large number of anticipated presentation proposals for annual meetings and the limited symposia space available, and also to maximize the number of good proposals that can be accepted and to generally improve the quality of CAST sessions, all proposals for Fall programming will be received directly by the corresponding Area Chairs and then rated by panels of session chairs for selection and allocation to specific sessions. Because of this centralized selection process, the deadline for receipt of proposals is ONE MONTH EARLIER than formerly:

March 1, 1994 (i.e., ASAP): Submit an abstract (camera-ready) on a completed original AIChE Proposal-to-Present Form and also six copies of an extended abstract of approximately 500 words for use by the selection panel to the corresponding AREA CHAIR. It is appropriate to indicate for which session the contribution might best fit.

May 2, 1994: Session content is finalized; authors are informed of selection.

September 1, 1994: Authors submit, if desired, any revision to the abstract (camera-ready) to AIChE.

October 3, 1994: Authors submit final manuscript to AIChE.

November 13, 1994: Speakers bring hardcopies of visual aids to be distributed to the audience at the presentation.

There is an AIChE limitation that no person may author or coauthor more than four contributions at any one meeting nor more than one contribution in any one session.

Area 10a: Systems and Process Design

NOTE: Please Submit Proposal-to-Present Form and Six Copies of an Additional Extended Abstract for all Area 10a Sessions to the Area Chair:

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413-545-1647 (Fax)
mmalone@ecs.umass.edu

1. Design and Analysis.

Papers are solicited on recent developments in process design and analysis. Topics of interest include, but are not limited to, new process modeling methodologies, tailoring process models to design tasks, techniques for the design of specific units, design of integrated plants and systems, use of molecular structure and properties in design, design and analysis under uncertainty or with incomplete data, generic design methods, and case studies in process design.

Submit extended abstract to Michael F. Malone, Area 10a Chair at address above.

Session Chair

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2. Process Synthesis.

Papers are being solicited for a general session on process synthesis. This area includes synthesizing chemical flowsheets, chemical reactor networks, separation systems, heat exchanger networks, utility plants, and sustainable and environmentally friendly processes, as well as synthesizing, sequencing, and scheduling batch processes. Papers addressing analysis and optimization in the context of process synthesis are also welcomed. Examples of these topics include novel optimization methods for process synthesis, advances in artificial-intelligence-based or

heuristic-based methods for process synthesis, process stability, flexibility, reliability, and uncertainty issues.

Submit extended abstract to Michael F. Malone, Area 10a Chair at address above.

<i>Session Chair</i>	<i>Co-Chair</i>
Amy R. Ciric Dept of Chemical Eng University of Cincinnati Cincinnati, OH 45221-0171 513-556-2761 513-556-3473 aciric@mikado.che.uc.edu	Vivek Julka Union Carbide Corp P.O. Box 8361 South Charleston, WV 25303 304-747-5949 304-747-5448 (Fax) vivek@medinah.atc. ucarb.com

Joint Area 10a and Area 10b Session

1. Design and Control.

Papers are sought on topics that discuss the interface and interaction between design and control. Topics include the transfer of information between the process design and control system design, consideration of controllability, operability, and resiliency at the design stage, design retrofits that improve controllability, and sensor selection and location issues. Papers on industrial case studies involving the above issues will also be considered.

Submit extended abstract to Michael F. Malone, Area 10a Chair or to Ali Cinar, Area 10b Chair.

<i>Session Chair</i>	<i>Co-Chair</i>
Babu Joseph Chemical Eng Dept Washington University St. Louis, MO 63130-4899 314-935-6076 314-935-4434 (Fax) joseph@wuche2.wustl.edu	Jean-Paul Calvet Koninklijke/Shell -Laboratorium Badhuisweg 3 1031 CM Amsterdam THE NETHERLANDS 31-206-302485 31-206-304041 (Fax) calvet1@ksla.nl

Joint Area 10a and Area 10c Session

1. High Performance Computing in Computer Process Design.

Impressive gains in computer technology, in particular vector and parallel processing architectures, as well as advances in the numerical techniques used to take advantage of this technology, make possible today the solution of larger-scale and more realistically modeled chemical process design problems. Papers describing

applications of such technology and techniques in process design are sought. Also sought are papers describing numerical algorithms and codes for better exploiting vector and parallel processing in such applications. Papers may focus on design at the flowsheet or plant-wide level, or on the design of complex unit operations.

Submit extended abstract to Michael F. Malone, Area 10a Chair or Gary D. Cera, Area 10c Chair.

<i>Session Chair</i>	<i>Co-Chair</i>
Donald L. Miller E. I. du Pont de Nemours & Company P.O. Box 80328 Wilmington, DE 19880-0328 302-695-1644 302-695-9799 (Fax) miller@bullwinkle. wizards.dupont.com	Mark A. Stadtherr Dept of Chemical Eng University of Illinois Urbana, IL 61801 217-333-0275 217-244-8068 (Fax) markst@turing.scs.uiuc.edu.

Joint Area 10a and Area 8e Session

1. Process Simulation in Integrated Circuit Manufacturing.

Papers in the area of process simulation and control in integrated circuit manufacturing are being solicited. This area includes impurity profile optimization, growth quality optimization, photolithography process control, furnace control for diffusion, deposition, and annealing, simulation and control of rapid thermal processing, and film thickness monitoring and control. In short, any paper that addresses the use of simulation, optimization, and process control strategies in the manufacture of integrated circuits will be considered. If possible, such papers should address implementation and other practical issues of interest to industrial practitioners.

Submit extended abstract to Michael F. Malone Area 10a Chair at address above.

<i>Session Chair</i>	<i>Co-Chair</i>
Thomas A. Badgwell Dept of Chemical Eng Rice University Houston, TX 77251-1892 713-527-4902 713-524-5237 (Fax) tab@che.utexas.edu	Luke Achenie Dept of Chemical Eng University of Connecticut Storrs, CT 06269 203-486-4020 203-486-2959 (Fax) achenie@brc.uconn.edu

Joint Area 10a and Area 15c Session

1. Modeling, Simulation, and Computer-Aided Bioprocess Design.

Flowsheet and dynamic simulation, invaluable tools in the chemical process industry, are being increasingly used in the biomanufacturing area for process design, development, optimization, control, and economic feasibility. We are soliciting papers that describe experiences in the application of modeling and simulation to biological processes, either as off-line tools for process development or as on-line aids in process operation and control. Papers dealing with the synthesis, analysis, and evaluation of integrated bioprocesses in the areas of fermentation, cell culture, downstream recovery, and biological waste treatment are particularly welcome. Papers that describe novel experiences in industrial applications of bioprocess modeling tools are also solicited.

Submit extended abstract to Michael F. Malone Area 10a Chair at address above.

Session Chair

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Demetri Petrides
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Area 10b: Systems and Process Control

NOTE: Please Submit Proposal-to-Present Form and Six Copies of an Additional Extended Abstract for all Area 10b Sessions to the Area Chair:

Ali Cinar
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Illinois Inst of Technology
Chicago, IL 60616
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checinar@minna.acc.iit.edu

1. Advances in Process Control.

The object of this session is to provide a forum for presenting new and innovative techniques, methodologies, and/or applications in process control. Papers that advance the state-of-the-art in process control are sought. The main idea or theme of the paper presented should be clearly described in the abstract. Priority will be given to areas not covered in other process control sessions.

Submit extended abstract to Ali Cinar, Area 10b Chair at address above.

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Co-Chair

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2. Nonlinear Control.

Papers are solicited that describe new developments in the area of nonlinear process control. Topics of particular interest include, but are not limited to, controller synthesis in continuous and discrete time, control of systems with saturation, and performance and stability analysis. Experimental and industrial applications of nonlinear control are also welcome.

Submit extended abstract to Ali Cinar, Area 10b Chair at address above.

Session Chair

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3. Model Predictive Control.

Submit extended abstract to Ali Cinar, Area 10b Chair at address above.

Session Chair

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Evelio Hernandez
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4. Model Identification and Estimation for Process Control.

Papers are sought in the area of model identification and estimation. The emphasis is on models useful for process control design. Key areas of interest include selection of model structure, complexity and parsimony, selective forgetting in on-line estimation, model validation, design of experiments for identification, and black-box, grey-box, and first principles modeling. Contributions addressing the identification of uncertainty models useful for robust controller design will be given high priority. Papers addressing modeling issues of significance to practical engineering problems are welcome.

Submit extended abstract to Ali Cinar, Area 10b Chair at address above.

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5. Plant-Wide Control.

Contributions are solicited in the area of plant-wide control. Both academic and industrial papers are welcome. Of significant interest are papers that place the problem of plant-wide control into a framework amenable to mathematical analysis. Problems such as control of plants with extensive recycles, and enhancements in plant-wide controllability resulting from design improvements are of particular interest.

Submit extended abstract to Ali Cinar, Area 10b Chair at address above.

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6. Recent Developments in Modeling, Optimization, Computation, Monitoring, and Control [POSTER SESSION].

Submit extended poster abstract to Ali Cinar, Area 10b Chair at address above.

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Joint Area 10b and Area 10c Sessions

1. Statistics and Quality Control.

This session will focus on research advances and practical applications of statistical techniques to industrial processes with particular emphasis on quality control. Topics include, but are not limited to, chemometrics, nonparametric regression, multivariate analysis, PLS, process and quality modeling, computer implementation, and real time applications.

Submit extended abstract to Ali Cinar, Area 10b Chair or Gary D. Cera, Area 10c Chair.

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gcharos@nap.amoco.com

2. Process Operations and Fault-Tolerant Control.

Papers are requested in the area of process operations and fault tolerant control. In the area of fault tolerant control we welcome methodologies that address model structure, on-line fault detection and diagnosis, and intelligent control design. In the area of process operations, we look for innovative research that addresses all aspects of integrated plant operation, and in particular plantwide optimization and control, planning and scheduling of production and maintenance operations, batch operations management, the development and validation of operating procedures, and human factors issues arising in the operation of advanced automated plants. Papers that include industrial applications are especially welcomed.

Submit extended abstract to Ali Cinar, Area 10b Chair or Gary D. Cera, Area 10c Chair.

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Co-Chair

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Joint Area 10b and Area 8e Session

1. Process Control in Electronic Materials Processing.

This session will cover the application of advanced modeling, control, and measurement techniques to microelectronics processing. Papers that include experimental results are especially encouraged, although simulation studies that validate a methodology will also be included. Suggested topics include rapid thermal processing, chemical vapor deposition, lithography, plasma etching, crystal growth, and single and multiple wafer reactors.

Submit extended abstract to Ali Cinar, Area 10b Chair at address above.

Session Chair

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Joint Area 10b and Area 15c Session

1. Biosensors and Bioprocess Control.

This session invites papers in the area of biosensors and estimation, optimization, and control of bioprocesses. Papers in the area of application of analytical instrumentation, including biosensors, for the on-line monitoring of batch, fedbatch, and continuous fermentations are sought. Of particular interest will be the real-time implementation of these new methodologies in a closed loop control system, with focus on demonstration of the robustness of the instrumentation and associated data analysis under realistic operating conditions. Papers dealing with new estimation techniques such as Volterra series and Artificial Neural Networks to predict the states of fermentation processes are sought as well as optimization techniques such as genetic algorithms, and downstream processing in biotechnology.

Submit extended abstract to Ali Cinar, Area 10b Chair at address above.

Session Chair

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Co-Chair

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Area 10c: Computers in Operations and Information Processing

NOTE: Please Submit Proposal-to-Present Form and Six Copies of an Additional Extended Abstract for all Area 10c Sessions to the Area Chair:

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609-737-4516 (Fax)
gdcera@engprn.mobil.com

1. Advances in Optimization.

The goal of this session is to present novel methods and/or applications of optimization. Topics of interest include methods for nonlinear and mixed-integer optimization problems, differential/algebraic systems, and stochastic optimization problems that emphasize large-scale

computations or global optimization issues. Applications of interest include models for design, planning and scheduling, and particularly those that integrate any of these aspects. Industrial applications and computational experience with new techniques are also welcome.

Submit extended abstract to Gary D. Cera, Area 10c Chair at address above.

Session Chair

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Co-Chair

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2. Data Interpretation.

The focus of this session will be on the techniques and tools used in data interpretation. Papers that discuss data interpretation for the purposes of monitoring process control system performance and for detecting state changes and faults are sought. Monitoring and detection are defined broadly to include artificial intelligence, statistical, system theoretic, and integrated approaches. Data interpretation methodologies and approaches for generating states of unmeasured variables are also considered to be important. Papers emphasizing on-line interpretation and adaptation as well as performance investigations through case studies are also welcome.

Submit extended abstract to Gary D. Cera, Area 10c Chair at address above.

Session Chair

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3. Intelligent Manufacturing Systems.

(Cosponsored by the International Cooperation Committee of the Society of Chemical Engineers, Japan.)

Contributions are sought describing methodological developments, implementations, and experiences with all aspects of computer integrated manufacturing in the process

industries. Subjects of particular interest include integration of application areas such as plant information systems, monitoring, diagnosis, control, scheduling, planning, optimization, and design as well as developments within application areas themselves that focus on integration issues. Presentations of industrial experiences with intelligent manufacturing systems technology and critical discussions of advantages and limitations of current approaches are also welcomed. Abstract should summarize the scope of the work, the methodology employed, and significant conclusions and accomplishments.

Submit extended abstract to Gary D. Cera, Area 10c Chair at address above.

Session Chair

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Area 10d: Applied Mathematics and Numerical Analysis

NOTE: Please Submit Proposal-to-Present Form and Six Copies of an Additional Extended Abstract for all area 10d Sessions to the Area Chair:

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609-258-6744
yannis@arnold.princeton.edu

1. Engineering Applications of Chaos and Fractals.

Fundamental aspects of chaotic dynamics and fractal geometry have received a great deal of attention in the past decade. In contrast, although chaos and fractal concepts have found practical applications in a variety of technologies, these applications have been considerably less publicized and are not well known. The goal of this session is to emphasize practical aspects of chaos and fractals across the chemical engineering field.

Submit extended abstract to Yannis G. Kevrekidis, Area 10d Chair at address above.

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Co-Chair

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2. Computational Integral and Spectral Methods in Chemical Engineering Applications.

Computational strategies based on integral equations and spectral expansions offer a powerful alternative for the solution of partial differential equations describing continuum phenomena related to fluid mechanics, energy and mass transport, coupled or uncoupled to chemical reaction. These methodologies present a number of advantages with respect to other techniques such as finite element and finite difference methods. Some of these potential advantages include grid reduction without loss of accuracy, flexibility and thus adaptability to different problems with minimum modifications, and a priori convergence conditions. The methodology, however, must be properly designed and implemented in order to take advantage of the above mentioned characteristics. This session is an effort to provide a forum for the discussion of several aspects of computational integral and spectral methods. Contributions related to Gibbs phenomena, acceleration of convergence, filtering and aliasing strategies, the study of multiplicity and stability and comparison with other techniques will be welcomed. Illustrative applications may include problems in Newtonian and non-Newtonian fluid dynamics, chemically reacting fluids, material design and processing, and heat and mass transfer. In addition, submission of papers related to the application of a close new effort—the wavelet theory—to speed up convergence in Fourier expansions is encouraged.

Submit extended abstract to Yannis G. Kevrekidis, Area 10d Chair at address above.

Session Chair

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Co-Chair

Marios Avgousti
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3. Nonlinear Dynamics and Pattern Formation.

Contributions on dynamical systems theory approach in control, fluid mechanics, reaction engineering, transport, etc. are sought. Of particular interest is the use of local bifurcation theories to understand pattern formation and other instabilities.

Submit extended abstract to Yannis G. Kevrekidis, Area 10d Chair at address above.

Session Chair

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4. Probabilistic Models.

This session will focus on applications of probabilistic concepts to continuous and discrete models of chemical engineering systems. Topics of interest include, but are not limited to, chemical reaction models, percolation processes, population balance models, etc.

Submit extended abstract to Yannis G. Kevrekidis, Area 10d Chair at address above.

Session Chair

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*Send in recruiter's information and registration form to
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*Atlanta, GA
 April 17-24, 1994*

First Call for CAST Sessions
1995 AIChE Spring National Meeting
Houston, TX, March 18-23, 1995

The names, addresses, and telephone numbers of the session chairs are given on the next several pages, as are brief statements of the topics to receive special emphasis in selecting manuscripts for these sessions. Prospective session participants are encouraged to observe the following deadlines which have been established, but may be changed, by the Meeting Program Chair:

September 1, 1994: Submit an abstract (camera-ready) on a completed original new-version AIChE Proposal-to-Present Form to the SESSION CHAIR and a copy also to the co-chair.

October 1, 1994: Session content is finalized; authors are informed of selection.

January 15, 1995: Authors submit, if desired, any revision to the abstract (camera-ready) to AIChE.

February 15, 1995: Authors submit final manuscript to AIChE.

March 19, 1995: Speakers bring hardcopies of visual aids to be distributed to the audience at the presentation.

There is an AIChE limitation that no person may author or coauthor more than four contributions at any one meeting nor more than one contribution in any one session.

Area 10a: Systems and Process Design

1. Design and Analysis.

Papers are solicited related to recent developments in process design and engineering analysis. The contributions can be new approaches or industrial applications and are expected to demonstrate useful and efficient methods in the context of process integration and optimization of chemical processes. Design methodologies based upon short-cut design methods, conceptual design approaches, and algorithmic procedures are all welcome. Areas of potential application include, but are not limited to, process synthesis and retrofit problems, design of energy recovery networks, reaction and separation systems, and batch processes.

Chair

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2. Process Synthesis.

Process synthesis, a key step in chemical process design, is concerned with identifying the basic flowsheet structure to be used from a typically large number of alternatives. The process economics and a number of other quality measures such as controllability, safety, compliance with environmental and other regulations, largely depend on the results of this conceptual design phase. The session will focus on new developments and applications of process synthesis methodologies such as mathematical programming approaches, heuristic strategies, thermodynamic methods, etc. Areas of application are not limited but contributions considering environmental issues are especially welcome. Also, papers addressing problems and future trends and challenges in process synthesis research are sought.

Chair

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3. Batch Process Design and Scheduling.

The sudden increase in the production of high-value-added, low volume specialty chemicals and biochemicals in recent years has generated a renewed interest in batch processing technology. The most outstanding feature of a batch process is its flexibility. However, this flexibility and the unsteady state nature of operation pose challenging design and operations problems. This session will focus on the issues related to design, operation, and scheduling of batch plants. This session seeks papers dealing with all aspects of the design of batch processes including retrofit, trade-offs between design and operations, design under uncertainty, industrial case studies, new design strategies and methodologies, etc. Also of interest are topics related to

sequencing and scheduling of batch plants such as resource-constrained scheduling, production planning, scheduling and planning in the face of uncertainties, and methodologies for scheduling.

Chair

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4. Design for Waste Minimization.

Papers are solicited related to the application of waste minimization technologies in the chemical process industry. In particular, the session welcomes contributions in terms of new and innovative designs, implementation of existing approaches, and successful case studies. Priority will be given to contributions which illustrate the usefulness and effectiveness of a particular technology in waste reduction via recycle/reuse or in-plant modification. These approaches can be based on short-cut methods, optimization, or simulation design tools. Research and development results where industry and academia have collaborated are also invited.

Chair

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5. Electronic Process Data Exchange – Tutorial Review of the PDXI Project.

This half-day tutorial session is organized by the staff and consultants of the AIChE Process Data Exchange Institute to review and present the results of the PDXI project conducted at the University of Missouri - Rolla since Fall 1991. A comprehensive overview of the reports and products of the PDXI effort will be presented. This includes the scope of the project, the methods used to represent and organize process engineering data and how to use the neutral file specification developed in the project to facilitate interfaces between common design calculations and computer

programs. The scope of the data processed by PDXI covers a broad range of process engineering needs. The data model can handle physical properties, process simulation, equipment design data, units and dimensions, geometric data, and a range of attributes used to apply the data exchange procedure to a variety of specific process configurations. The evolution and extensibility of PDXI project capabilities into their future will also be discussed.

No papers are being solicited for this tutorial session.

Chair

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Joint Area 10a and Area 10c Session

1. Emerging Technologies in Process Design and Synthesis.

Emerging technologies such as neural networks, genetic algorithms, fuzzy logic, AI methodologies, and MILPs are finding increasing uses in process design and synthesis. These uses have resulted in the need for faster turn around in computation time, increasing the need for high performance computing. To recognize and address these needs, papers are sought in these emerging technology areas. Such papers should address the use of parallel processing and any combinations of these emerging technologies for process design and synthesis. Papers should indicate if process design and synthesis benefited from the absolute performance (capability) or cost-benefit (capacity) sense of parallel processing and these other technologies, as appropriate. Comparisons to related work in other fields is considered important.

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Area 10b: Systems and Process Control

1. Economic Benefits of Process Control.

What are process control systems worth when going from manual to automatic? Electronic or pneumatic to distributed control systems? Basic to advanced control algorithms? Multiple control rooms to consolidated control centers? This session will focus on justification of control systems. Papers are sought in the following areas: methods used for justifying control system implementation when plant data is or is not available; how do you convince management to continue to support existing control systems or to support the installation of new control systems; how do you measure the contribution of control systems; what is the value of stabilizing your plant operation through process control; and how do you justify the cost of reinstrumentation in existing plants.

Chair

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2. Novel Applications in Process Control.

This session aims to highlight novel applications in process control. Papers, for example, may involve applications requiring interesting control strategies or tackling challenging processes. Industrial case studies and applications are strongly encouraged.

Chair

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3. Applications of Statistics in Process Control.

Papers are requested related to the use of statistical technologies for process control work. Example specific areas of interest include: use of plant data for monitoring and diagnosis of automated feedback controllers; tools for process monitoring and analysis; monitoring of plant performance using advanced multivariate statistical technologies; the use of statistical estimation approaches for

prediction, parameter estimation, inference, or optimal filtering; and novel use of statistical data based models in process control applications. Papers dealing with both practical applications and theoretical developments are welcome.

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4. Control Strategies and Integration of Design and Control.

The objective of this session is to examine the "big picture" of control system development and how strategies are developed and applied to the integrated process/control design effort. Preference will be given to papers which focus on broad control design strategy issues and integration methodologies. Contributions on plant-wide control or methodologies for the solution of standard industrial control problems will be welcome.

Chair

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Area 10c: Computers in Operations and Information Processing

1. Developments in Supply Chain Design and Optimization.

As industries continue to strive to reduce manufacturing costs including working capital while improving product quality, they have been focusing on the entire product supply chain from raw materials suppliers to end product consumers. This session will address all aspects of the supply chain from management to design and control. Subjects of particular interest include: application of simulation techniques to supply chain design and control; logistics network modeling and control; integrated approaches to planning and scheduling; and dynamic approaches to management and control. Presentations of

industrial experiences with supply chain methodologies are encouraged. Abstracts should summarize the scope of the work, the methodology employed or developed, and significant conclusions and accomplishments.

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2. Process Systems Engineering for Environmental Applications.

Environmental regulatory initiatives in the 1990s reflect the need for pollution prevention at the source prior to release to the environment. Process systems engineering technology can facilitate the challenging task of developing and implementing successful pollution prevention strategies. This session will focus on the use of process systems engineering methods and software tools for environmental applications. Topics of particular interest include process synthesis and simulation technology for addressing environmental issues, stochastic modeling for determining the environmental effect of process uncertainties, process optimization with environmental objective functions, and novel control strategies for reducing wastes and emissions.

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3. Process Operator Training.

Papers are requested which report new and improved ways to conduct process operator training. All aspects of training are of interest—both computer based techniques (such as dynamic simulation and computer based training), as well as the role of people in the learning process. Reports of improved ways to present information, to test for understanding, and to reproduce process behavior accurately are sought. Insights on what subject materials, especially how to accomplish more complete process understanding, would be welcome. While the focus is on operators, papers

will be considered which address training of other manufacturing personnel, engineers, and chemical engineering students.

Chair

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