

System Dynamics NEWSLETTER

Volume 16 – Number 2

Fall 2003

INSIDE

From the Executive Director	7	Member News	9	Chapter News	18
Jay Wright Forrester Award	8	July Policy Council Meeting	9	SDR Special Issue	23
Dana Meadows Prize	8	New York City Conference	10	2004 Oxford Conference	24

From the President

Adapted from the President's Address given at the International System Dynamics Conference in New York, July 2003

Dear Members of the System Dynamics Society,

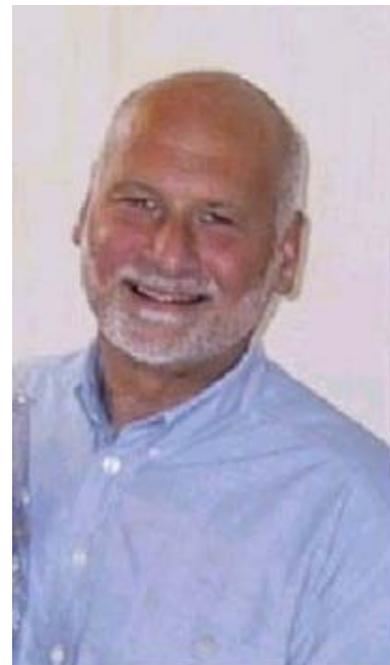
On behalf of the Society, let me first take this opportunity to officially congratulate the winner of this year's Jay W. Forrester Award, Nelson Repenning, and the winner of the Dana Meadows Prize, David L. Cooke, along with honorable mentions to Jan Jaap Bezemer, Özge Pala, and Klaus Vogstad.

I want to take this opportunity to thank you all, members of the system dynamics community, for having inspired me to work in this field – a field of endless opportunities for establishing professional and personal relationships and for interdisciplinary research, education and practice in an exceptionally wide variety of domains.

In the last issue of our Newsletter, there is a picture of the participants at the International Conference on System Dynamics at Geilo, Norway, in 1976. It is a rare picture of a collection of pioneers in our field – a conference that resulted in the profoundly interesting book *The System Dynamics Method*, edited by Jørgen Randers. I would have liked to have been there – it would have saved me long detours in my research.

Eight years later, I met with several of you at the conference in Oslo. George Richardson and John Sterman subsequently introduced me to this community of scientists and teachers. To meet and work with the people behind the papers and presentations made a world of difference to me. I sensed a willingness in this community to address major, real, complex, dynamic issues. I soon understood that the dedication to the system dynamics method, so strongly articulated in this community, did not originate from a religious belief, but from a realization that the method was exceptionally well suited to address these kinds of issues, to help us understand the issues and, perhaps even more importantly, to help us understand why we often do not understand them. From this realization comes the profound respect for complexity, the critical thinking skills, and the truly exceptional willingness to share their insights that members of this community have in common.

This very personal experience of my first system dynamics conference I know I share with most people who meet us in such a context for the first time. It is such a precious moment that I think we who have been here “forever” should take a moment to reflect on how we welcome them. Let me take this opportunity to give a



Society President Pål Davidsen

very warm welcome to our new members and first-time conference attendees.

In line with what I just said, I regret to have to report to you that for some people around the world it becomes increasingly difficult to attend our conference due to severe security restrictions imposed upon travellers across our globe. On behalf of our Society I can only regret that our members are facing such constraints and have to endure such discomfort in their sincere attempts to take part in the development of our field. And I can promise that I will find ways to meet for scientific discourse.

I believe that this community is a resource that can be more effectively put to use for the benefit of society at large. One of the most important tasks for the System Dynamics Society is to find ways to accomplish that. In this address to you, I will talk about some of the challenges that the System Dynamics Society, our community, and society at large are facing and how I think we might be addressing those challenges.

Let me first tell you that I think it is important to the field and, therefore, extremely encouraging to find that there is a growing number of exceptionally competent women entering our field.

Then let me first turn to our own Society. I think it is important that you, members and potential members of our Society, are aware of the concerns of our Policy Council, our officers, and our home office. We want you involved as active participants in shaping the Society so that it can work effectively to the benefit of you, its members.

If you read the phenomenal report on the Society produced by our home office, you will see that our Society has grown exponentially in terms of members. Over the last couple of years, we have developed from a Society relying entirely on volunteer contributions to one that, for the most part, is professionally run by the executive office located at the New York State University at Albany. So effective have been our Executive Director, Roberta Spencer, and her associates and volunteers at Albany that very many of the tasks previously handled on an *ad hoc* basis by volunteers are now taken care of.

We members have come to expect that the Home Office has infinite capacity. At the moment, however, there is not sufficient funding to support the huge amount of work currently undertaken by that office. Consequently, such a shift of the burden to the intervener has left the home office understaffed and underfunded. The reason for this is, in part, that

the membership fee has not developed at the rate of the services offered by the Society.

So, while taking care that low- and regular-income members will be shielded, we consider a change in the fee structure of the Society. Moreover, we are actively looking for ways to generate additional income. For years, Beer Game sales has been an important source of income. I would like to challenge the membership to develop and donate a new game from which we may all benefit. In the meanwhile, other options are being considered, such as the licensing of courses. We would certainly be open to additional suggestions as to how the Society can, cost-effectively, serve you better.

A major portion of the work conducted at the Home Office is related to the annual System Dynamics Conference. For that, and a number of other good reasons, we are about to modify slightly the way we select conference sites, take a stronger hands-on approach in the organization of conferences, and improve the program structure so as to offer better exposure to quality work and increase participant interaction. Again, we welcome suggestions from our membership. I will return to the importance of such a restructuring of the conference to the way I believe our field will develop in the future.

The Society concerns itself with the growth of the field and its community of system dynamicists at large: scientists, educators, students and practitioners in the private and public sectors. As we all realize, the dynamics of the field is governed by a non-linear feedback structure. I would like to challenge the students present at this conference who might want to develop and analyze a model of the field and help us come up with appropriate policies for a sustainable development.

The growth concept itself is not simple and has a variety of dimensions that we need to distinguish, in particular growth in volume and growth in quality. The concern has been raised that rapid growth, in terms of number of practitioners, may compromise quality in the work accomplished. Moreover, there is the concern that such quality erosion may backfire to hurt the field in the form of a bad reputation.

In particular, this has been an issue in our debate on conferences. Indeed, if one takes our conference as an indicator, there *is* a spread of quality among the papers submitted. So this is a valid concern. Yet, such a distribution is a natural consequence of an exponentially growing field in which the seasoned masters constitute a decreasing minority. Some deviation from perfection is OK. Without it, there is

no room for improvement, no potential for learning. More than any, our Society believes in corrective feedback and it is essential that we, in our conferences or any other fora where we meet, make room for imperfections and ensure that proper feedback is offered. The listserv entertained by Ventana and the PhD colloquia organized by the student chapter are among our more successful established feedback mechanisms. Yet, with improved capacity, we can do a lot better. And herein lies the key to success: We need to build feedback capacity to strike a reasonable balance between quantitative and qualitative growth.

As a result of the current, intense press coverage of world events, there is undoubtedly an increased public awareness (recognition) of the dynamic complexity of that world. There is a growing sense that we need to understand that complexity and, based on such an understanding, develop policies that effectively deal with the challenges with which we are confronted. In theory, therefore, there should be a growing demand for system dynamics.

In practice, however, the specific call for a system dynamics approach to deal with existing problems is hardly audible. We understand the reasons for this:

For each and every domain of application, other theories, methods, techniques, and tools have already been developed and gained recognition, and are currently being employed and taught in schools, colleges, universities and courses by an establishment of scientists and practitioners. In emerging as well as more established fields, strong reinforcing mechanisms play out. They contribute to establish a field identity, to support the establishment of scientists and practitioners in the field, to build a portfolio of success stories, and also to inbreeding.

As indicated by Professor Forrester and demonstrated, in the case of economics, by Mike Radzicki, Glen Atkinson, Jed Schilling, and Jerry Barney, there is growing evidence that some of the ways currently employed to go about addressing real complex, dynamic issues have their shortcomings and have not always been successful.

There are two approaches we may take, and one does not exclude the other:

Professor Forrester suggested one. Based on the assumption that there is no hope for people who adhere to linear, open-loop, equilibrium thinking, we need to educate a new generation of scientists and practitioners starting in K-12. Jay Forrester, backed by his mentor, Professor Gordon Brown, sponsors

such as the Waters Foundation, facilitators such as Nan Lux and Lees Stuntz, motivated students at MIT and innovative educators such as Diana Fisher and many, many others initiated an impressive program that has led to the introduction of system dynamics in North American schools.

Here is another way to go about it: In the confidence cracks that result from a growing awareness of the shortcomings of alternative approaches, we may search for fertile soil and a golden opportunity for the introduction of system dynamics.

This way, we need not act with confrontation and emphasize system dynamics as an alternative approach, although this is actually the case, but may portray our approach as an enhancement, a reinforcement, of existing theories, methods, techniques, and tools. We may employ a friendly Trojan horse – not a fake one that wins by deceit, but a real one that can carry a load of success.

Here are some of the reasons why this might work in various disciplines and domains:

1. It will allow us to tap into the lingo of the domain to effectively introduce more alien concepts such as structure and behavior, stock levels and flow rates, accumulation and delay, and, last but not least, feedback and non-linearity. These are concepts that, in each and every domain, take on a unique meaning (if any at all), and when used without a careful adaptation may seem meaningless at best. Yet more often they lead to confusion.
2. Employing a friendly Trojan horse will help us address problems *people* believe they have, not problems *we* believe they have but that they may not recognize. In other words, we will tap into frustration and offer enlightenment and, potentially, solutions to real problems. This is what I mean by fertile soil. Marketing system dynamics otherwise is extremely difficult. We market system dynamics as a way to address and cope with dynamic complexity. Yet, in our marketing, we are often asked to demonstrate its effectiveness under severe time and resource constraints. These are constraints that do not allow for elaboration, and so it becomes paramount to address the specific, current needs of our clients.

What I have stated here, applies not only to various fields of applications, but also to disciplines themselves, such as OR, that may well benefit from the adaptation of system dynamics. This way, I believe system dynamics may gradually gain exposure and demand may pick up. That takes good

scholars working intimately with open-minded specialists in various domains and disciplines to assimilate that specialization. And it takes good textbooks, appropriately adapted to the variety of domains and disciplines that may benefit from system dynamics.

Our best system dynamicists are scholars of this kind and authors of such textbooks. They are among our best practitioners and educators. I think we all have a lot to learn from them on how to introduce system dynamics in ways that do not raise suspicion, aggravation, and resistance.

I think it is important to keep in mind that, because system dynamics, when applied appropriately, is extremely powerful, it may inadvertently be perceived as intimidating and confrontational. If people do not understand the dynamic complexity of their own field, it is not because they are stupid or incompetent, it is because they have not had the benefit of the theory, methods, techniques and tools that allow them to gain such an understanding. Again, through system dynamics we gain respect for complexity and that respect must extend to the people trying to cope with that complexity, whether they are school children, students, scientists or practitioners in the private or public sector.

So the need for system dynamics is there. For this need to manifest itself into actual demand, we need fora for exchange of ideas and insights. This is where I will come back to the structure of the system dynamics conferences. It has been proposed that future conference programs be organized around threads that exhibit the application of system dynamics in various disciplines and, across disciplines, in various domains. In addition, there will be threads addressing recent developments in theory, methods, techniques and tools. These threads will be designed and chaired by experienced system dynamicists with a keen interest in hosting such a thread. These chairs will serve as such for a number of consecutive conferences and will, together with the Program Chair, constitute a somewhat more permanent Conference Committee.

I expect that such an improvement of the program structure, in particular a more permanent responsibility for and identification with threads, will benefit the quality of the conference. We have seen an emerging example of that associated with the micro-thread on security. The presenters in that thread all met in a workshop earlier this year to prepare and critique their drafts and have published an affordable special collection of papers in that domain.

Moreover, and perhaps more important, such a program structure has the potential to greatly benefit the community of system dynamicists at large. I would expect that we will see a number of special interest groups (SIG's) grow out of these threads. Each such group will be able to connect to experts in related fields, to invite them to our conferences, and to offer threads in their conferences. We need them as well as they need us. Such a mechanism will allow our field to effectively reach out to other disciplines and gain exposure in a variety of domains of application.

Moreover, it will serve to solve a dilemma: To promote cross-fertilization, it has repeatedly been suggested that we co-organize our conference with other conferences, such as TIMS, AOS and others. Yet, we recognize that few such arrangements would satisfy even a majority, let alone all, of our members. With the establishment of threads and SIG's emerging as a result, we may comfortably reach out to a variety of communities of scientists and practitioners. Such interaction will contribute to strengthening our conferences, in terms of structure, variety, and quality.

Practice in various domains constitutes our growth engine. Good practice breeds demand for additional work. We fuel this engine with human capital through our education and with technology through software development. If scholars, educational material, including textbooks, effective educational programs, and technology are in short supply, inaccessible, or inadequate, then a rapid growth in the demand for system dynamics will cause:

- a. clients, in search of solutions, inevitably to turn to other competencies offering alternative approaches; and
- b. people to employ system dynamics and associated software less competently so that we, in the long term, will experience an increase in the amount of low-quality work offered, and the field will develop a bad reputation.

The growth of our field is effectively constrained by the supply and quality of human capital and technology.

It is, consequently, of utmost importance that we continue to develop our educational capacity, in terms of volume as well as quality. Among the set of goals that we should strive towards, are the following:

- Increased capacity in existing academic programs. This calls for an effective PhD education, for funded opportunities for research in academia, for the allocation of chairs in our

- field and for effective tenure processes.
- A higher degree of specialization in system dynamics and its practice. This calls for more high quality research in basic system dynamics – an issue I will address later.
 - New, innovative educational programs in and across a variety of disciplines and domains, targeting practitioners as well as academics.
 - Improved program coordination to avoid overlap and to benefit students. In Europe, where a number of universities offer a variety of graduate courses, we are about to take an initiative to establish a multi-institutional Marie Curie Early Training Site with a joint educational program for PhD students from within the European Community, as well as associated and other nations – students that will be funded by the Community through this program.
 - Effective use of new media technology so as to enable us to offer more flexible and accessible programs while, at the same time, utilizing our educational capacity more efficiently. In particular, this will be an important measure to offer an educational opportunity to members of our community who may not take advantage of traditional academic programs. A first step in this direction has been taken by MIT in the form of its outreach program in system dynamics – a program that has currently been taken over by WPI and is coordinated by Jim Hines. I think also the example set by David Wheat in the form of his web-based macro-economics education (demonstrated in a conference workshop) illustrates high-quality technology intensive work by a single person in this field. With the implementation of effective, web-based learning portals across academic institutions, I expect more programs of this kind to be made available in the near future.

I said that I would return to basic system dynamics research. By this I mean research on the theory, methods, techniques and tools that constitute the foundation for our work. With a few, brilliant exceptions, little has been happened in the area of theory, methods, and techniques since Jay Forrester and his PhD students took their first steps up the path that subsequently led to what we now call system dynamics. As for tools, some major innovations have produced software that has improved the way we visualize and analyze models. In spite of this development, the lack of basic research is apparent and of serious concern. Such research should constitute the foundation for further software development in three major directions:

One is to make system dynamics more accessible to the public, i.e. to model developers, model consumers and model communicators.

Research is required into the bridging of spreadsheet with system dynamics technologies so as to bring on board a vast group of, in part, deeply concerned modelers struggling with an inadequate tool, just not really realizing what their problem is. This technology is exemplified by the work being done by Mohammad Mojtahedzadeh.

Research is also required to improve visualization. At the moment there is a major divide between the representation of system structure and system behavior. Except for a very important increase in the use of phase diagrams, minor progress has been made to illustrate the core issue in system dynamics – namely, the relationship between structure and behavior in complex, dynamic systems. A very encouraging exception to this fact is work behind the SyntheSim facility offered by Vensim. Along the same line, there has been very moderate research into the use of new media technologies to enable system dynamics to meet the public by distilling and “telling the story.”

And research is required to ensure ways to effectively generalize, store, retrieve and reuse a repository of generic models, through the process of encapsulation, inheritance, instantiation, parameterization, and initialization. We should more aggressively adapt an object-oriented approach to modeling – well recognized as a key to boost productivity in software engineering.

The next area of basic research constitutes the foundation for experimental system dynamics aimed at revealing the mental models and processes governing our actions in complex, dynamic environments – i.e. to prepare system dynamics to work effectively with the community of cognitive, behavioral and social psychologists. We need to elaborate our ways of designing, conducting and analyzing the results of such experiments, and we need software support to set up interactive labs for this purpose, for effective interface design, and for data collection and subsequent analysis.

Finally, what I think is perhaps the most important challenge in basic research is to understand the relationship between structure and behavior in non-linear, dynamic systems. This is a challenge faced by model investigators and policy designers. This research has four components.

In our analysis, we need to find out what part of the structure, at any point in time, governs current model behavior. As this will change over time, we need to develop a method for model (system) surveillance.

Moreover, we need to develop measures for leverage point elasticity – to obtain indications of how effective the utilization of various leverage points will be in improving model behavior, by way of modifying the relative significance of various structural components in the model.

We then need to develop ways to control the relative significance of the components of the underlying model structure in the form of policies, so as to reinforce favorable at the expense of unfavorable model behavior.

Ultimately, we need to find ways to implement our research findings in the form of software that visualizes the relationship between structure and behavior so effectively that the conclusions from our analysis and policy design become self-evident. Such an approach would increase the likelihood that our clients adopt the outcome of our analysis and implement our policy recommendations.

As exotic as this may sound, there is currently ongoing work in each of the basic areas of system dynamics that I have outlined. Due to the significance of this work, I believe that the results will find their way into software tailored to meet our needs. To speed up this process that will benefit us all, we should encourage, sponsor, and engage ourselves in this kind of research and establish tighter links between the community of researchers working in these areas, practitioners in need of the technology, and software developers.

Beyond what I have said about the need for and the opportunities to work with members of other disciplines and domains, I will not take time to comment on the variety of applications of system dynamics. It is sufficient to state that the scope and the quality of work being conducted are simply impressive.

But I would like to follow up what Jay Forrester, Mike Radzicki and others have emphasized throughout this conference – the fact that we need to address the major issues. Now, what those issues are depends on the perspective one takes.

Let me offer my perspective, that of people in the world in distress from poverty and armed conflicts that result from social injustice, political unrest, or plain malgovernance.

We are gathered in New York City – the USA's melting pot and the capital of world diplomacy. The ultimate purpose of diplomacy is to prevent conflicts from arising and to resolve conflicts by peaceful means once they have arisen.

Earlier this year, diplomacy failed. Never before have so many people, all over the world, been able to observe cultural clashes, lies and deception, political pressure, and dirty deals, bringing the UN to a stalemate. Regardless what side one chooses to take, I think one might agree that the associated political conflict resulted from poor political and diplomatic craftsmanship for which many nations must share responsibility.

The conflict over Iraq is the one that caught our attention this year. Remaining unresolved are several hundred local and regional conflicts that claim thousands of innocent victims every single day, most of them in the developing world.

Many of these conflicts remain unnoticed for decades. In several cases, they are not even considered conflicts because their more disadvantaged stakeholders have no power to speak up. These stakeholders are subject to bad, often corrupt, governance and are victims of social injustice. They are victims because they are not offered sustainable living conditions, including basic health care, are not given the opportunity to provide for themselves, say, through education, and remain at the mercy of social welfare or ruthless exploiters. It is a grave fact that most of these victims are women and their children who, if they ever had a chance, would constitute the future of our civilization. It is also a sad fact that many of these children are brought up to recognize crime as the only way by which they may escape what seems to be their destiny.

It does not take much analysis to recognize that, in these cases, we find ourselves in a fuzzy, uncertain, dynamic, non-linear feedback environment, governed by multiple stakeholders who hold a variety of misperceptions, unaligned goals, hidden agendas, and conflicting visions for the future. Needless to say, to a system dynamicist, this sounds like an opportunity not unlike what we have been used to find in corporations and one not to be missed.

Sincere compassion and professional inspiration compels me to ask the question: How may we employ system dynamics as a means toward national and international conflict resolution, conflict prevention and social rehabilitation?

Maybe I am overly optimistic, but I am convinced that our approach has the potential to help people in conflict distil mental models, come to consensus as to what constitutes the core of their conflict, and represent that core in the form of an explicit road-map model that may be applied for analysis and policy alignment to secure peace and to bring about political stability and social sustainability. Personally, I am very much looking forward to the opportunity to work next year with the Millennium Institute, Mike Radzicki, the Carter Center and the World Bank along these lines.

We are faced with the daunting task of bringing system dynamics to the developing world. Here is my comfort: As indicated in reports, such as the one published by the Structural Adjustment Participatory Review International Network (SAPRIN), I think it is safe to say that nowhere else do we find more fertile soil for our seeds than in the developing world.

Nowhere else has the limited success or even failure of traditional approaches to conflict resolution and development planning been more apparent. Nowhere else have their failures in addressing social problems had graver consequences. Nowhere else has the motivation to find alternative approaches been greater. And nowhere else have the educational systems from kindergarten to university been more ready for adaptation.

I conclude my address by wishing that you may find great satisfaction in the use of system dynamics for what you think are the major issues in your world.

Pål I. Davidsen

From the Executive Director

Although he is missed, I am very pleased to report that Vedat Diker, has taken a faculty position at the University of Maryland in the College of Information Studies. The Society hired Vedat in the summer of 2000 as a graduate assistant, but he has been a volunteer here since 1998. Vedat was instrumental creating the web-based conference paper review and submission systems. He also worked closely with Jack Pugh, Webmaster, assisting him to maintain the Society webpage. Vedat will continue to volunteer his efforts; he is currently working with Bob Eberlein to improve the conference paper submission process.

Among many other responsibilities, Jen Rowe, Assistant Director, continues to manage our membership, working hand-in-hand with John Wiley & Sons and MemberClicks, our online membership directory provider. Membership is growing. Last year in mid-October we had 860 members; this year at the same time we have 927. Our total membership for 2002 was 878. In the office we also have Joan Yanni and Robin Langer who continue to support office operations during peak periods. Jennifer Ferris, Bibliographer, continues to update our bibliography twice per year. There are currently over 7000 entries in the System Dynamics Society bibliography.

A financial summary of 2003 will be presented at the February Policy Council Meeting. Our finances are in better shape this year than last, though we continue to operate at a deficit. The New York City Conference made a profit and membership is up, but product sales are slightly down. For the first time in quite a few years, publications sales (Conference Proceedings and past issues of the *System Dynamics Review*) are up. As a result of the hard work and tremendous commitment of Jay Forrester and Nan Lux, the Society will soon offer a new product. During the last two years, some 4000 D-memos from the files of the MIT System Dynamics Group have been scanned and compiled onto one DVD disk. A notice will be sent out when the DVD is available for sale.

Each year starting in September we run a Society Sponsorship Campaign. Sponsorship funds help provide membership services such as the on-line directory, bi-annual newsletters, updates to the bibliography, and website maintenance. Sponsorship support truly makes a difference and we are endeavoring to expand our sponsorship base of businesses, universities and individuals. If you know of a potential sponsor or would like to learn more, please feel free to contact me.

Very soon you will be receiving the 2004 Oxford Call for Papers by mail. The Conference Chair, Jonathan Coyle, and Program Co-Chairs Mike Kennedy and Graham Winch are already hard at work! In early January we will be mailing the conference registration brochure. Because of limited space at the conference venue, Keble College, we are strongly suggesting to register early. Refer to the Society website for conference updates.

Please contact the Society office if there is anything we can do for you.

Roberta L. Spencer

Nelson Repenning Wins Forrester Award

The Jay Wright Forrester Award recognizes the author of the best contribution to the field of system dynamics in the preceding five years. The winner in 2003 was **Nelson P. Repenning** for his paper “Understanding Fire Fighting in New Product Development” published in 2001 in the *Journal of Product Innovation Management*. The citation and the winner’s speech (delivered at the award ceremony in New York City) will be published in full in the *System Dynamics Review*. Below is a short excerpt from the citation.

Nelson Repenning is Associate Professor of Management at MIT Sloan where he recently received tenure. He obtained his PhD in Management from Sloan in 1996 and subsequently joined the faculty in Operations Management and System Dynamics. In the period 1995-1998 he was co-principal investigator on “Designing Sustainable Improvement Programs,” involving joint applied research with MIT, Ford Motor Company, Harley-Davidson, AT&T, and National Semiconductor. In the period 2000-2002 he was leader of the Implementation Dynamics Initiative in the Center for Innovation in Product Development at MIT.

It is out of such in-depth applied research that Nelson’s award-winning work arises. His overall research centers on understanding why many attractive and beneficial innovations and change programs designed to improve organizational performance often fail to take hold. He is especially interested in the implementation process, for example, the dynamics and side effects of a firm’s attempt to implement quality improvement tools or new product development methodologies.

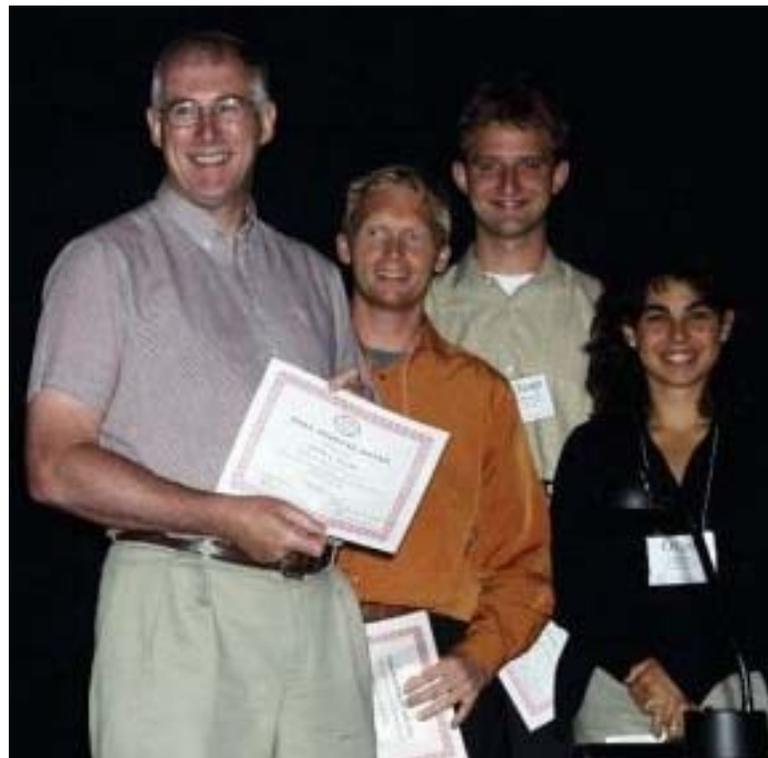
John Morecroft



John Morecroft, Chair of the Awards Committee, and Nelson Repenning

Dana Meadows Student Prize Awarded

This year’s winner of the Dana Meadows Prize for the best student paper presented at the annual conference was **David L. Cooke**, Haskayne School of Business, University of Calgary, Canada. David’s paper was entitled “Learning from Incidents.”



David Cooke, Klaus Vogstad, Jan Jaap Bezemer, and Özge Pala

Honorable mentions went to (in alphabetical order):

Jan Jaap Bezemer, Eindhoven University of Technology, The Netherlands, and co-author **Henk Akkermans**, for “Understanding Delays in Semiconductor Supply Chains”

Özge Pala, Nijmegen Business School, The Netherlands, and co-author **Jac A.M. Vennix**, for “A Causal Look at the Occurrence of Biases in Strategic Change”

Klaus Vogstad, Norwegian University of Science and Technology, Norway, and co-authors **Ingrid Kristensen** and **Ove Wolfgang**, for “Tradable Green Certificates: The Dynamics of Coupled Electricity Markets”

New PhD's

Alexander Ryzhenkov, *Math. and Instrumental Methods of Economic Theory*, a second dissertation approved by Russia's Education Ministry, July 2003

Hakan Yasarcan, *Feedback, Delays and Non-Linearities in Decision Structures*, Bogaziçi University, July 2003

In Memoriam Lee Frost-Kumpf

Lee Frost-Kumpf passed away on August 15, 2003.

In recent years, beginning at the conference in Atlanta, Lee was enthusiastically and actively involved in the efforts to establish a “policy dynamics” strand of activity in the Society. Indeed, Lee chaired a session at the New York conference in one of his last public, professional activities.

The Society has lost a member whose potential was only just beginning to be appreciated.

John Heinbokel

Nan Lux Retires from MIT

After some 16 years working with Jay Forrester at the System Dynamics Group at MIT, Nan Lux retired at the end of August, 2003. During that time she made many and continuous contributions to system dynamics. For several years, Nan was Vice President for Chapters of the System Dynamics Society. She played a major role in guiding a rotating group of MIT undergraduates who created the Road Maps series of exercises and the Guided Study in System Dynamics Program to create self-study material for learning the basic principles of the field. During the last two years, Nan Lux scanned some 4000 D-memos from the files of the System Dynamics Group. This archive, along with many theses and other papers, will become available from the Society on a DVD disk.

Jay Forrester



Jay Forrester, Nan Lux, and John Sterman

Policy Council Holds Summer Meeting in New York

Minutes of the 20 July, 2003, Meeting of the Policy Council and the 23 July, 2003, General Business Meeting can be found in their entirety by clicking the “Governance” button on the System Dynamics Society website. Please visit the website to learn about the business discussed and to view the complete reports and information presented.

Motions approved at the Policy Council Meeting:

- Proposed 2004 budget
- Conference structure items:
 - Michael Kennedy and Graham Winch are Program Co-Chairs for the 2004 Conference.
 - Submission and review process are adjusted to meet the needs and not be strictly bound by the standardized program guidelines adopted last year.
- Organizing committee to recommend a northeastern US location for 2005.
- Membership of Nominating Committee

Motions approved electronically since the Summer Policy Council:

- Boston, Massachusetts USA as the 2005 conference site
- Health Policy Special Interest Group

New York City Conference Report

Photos from the New York City Conference are posted on the Society website at <http://www.systemdynamics.org/conf2003/pictures/> – please take a look if you have not already done so. One of the best is that of Nan Lux, at the surprise tribute for her retirement. We wish her much success and happiness as she moves on to new adventures! Although there are no photos, an unforgettable session was “Celebrating the Diversity of System Dynamics” honoring Barry Richmond. We thank the many members of Barry’s family for attending.

You will find below articles written by volunteer conference session reporters. While not all sessions are covered, we hope these give a feel for the conference. There was an interesting mixture of work presented at the conference. The Public Policy Thread included issues such as health care, security, urban dynamics and military applications. It accounted for almost one quarter of all the conference presentations. Another sizeable thread was Methodology, again including a range of issues and topics. The third largest thread related to the conference theme, Economic Dynamics. The New York City conference had the highest registrations to date, totaling 460 from 45 countries. Extra copies of the proceedings are available through the Society office.



Some members of the conference team: Pål Davidsen, Bob Eberlein, Mike Radzicki, Roberta Spencer, and Allen Boorstein

From the 2003 Conference Organizing Team, thanks!



Jay W. Forrester addresses a plenary session, “Economic Theory for the New Millennium”



Conference volunteers Ignacio Martinez, Silvia Ulli-Ber, and Vedat Diker

Posters

Located in the heart of all Conference activities – on the Mezzanine Level – the participants encountered twice a day – in the morning and in the afternoon – a refreshment break for both flesh and soul. While coffee, tea, and some pastries helped to keep the energy level high, the poster market generated stimulating discussions in the process of exchanging ideas. This forum broke the mainly one-way communication of the plenary and parallel sessions – a welcomed change to keep the mind awake.

Nearly a hundred projects were presented in numerous theme clusters. An overall impression of these sessions was stamped by diversity: in the design of the posters, in the topics, and in the state of the art of the work.

Nearly all posters attracted interest. The authors enjoyed direct contact with their audience and they were quite busy explaining their work. Mostly, they found themselves involved in deepening discussions and exchange of experiences. Nearly always they received constructive feedback. Authors and participants made important contacts and, in the process, discovered peers that are working (or have interests) in related topics.

A poster session is an attractive alternative to an oral presentation. Many claimed that poster presentations had a higher return on investment than oral presentations. This indicates that presenting work in a poster session is also a great opportunity for networking, exchange and inspiration.

In retrospect, it is fair to say that it was not only the quality of the posters but also the overall setting of these sessions that was critical for their success. The informal atmosphere was refreshing and facilitated the exchange of ideas. The central location brought the audience in contact with the presenter. Given these highlights the crowding in the hallway could not cast any deep shadows on the poster sessions.

Silvia Ulli-Beer



Poster sessions: Lubomir Kostron



Poster sessions: Jim Lyneis and Krystyna Stave

Defining and Refining Methodology

If system's redesign is the *raison d'être* of system dynamics, what is hampering its successful application as a policy design tool? What challenges are presented to the field as it struggles to improve the world? The two views presented in this plenary session provided different answers to this appraisal. One stated we need a good and reliable compass; the other argued for more velocity.

Henk Akkermans and Georges Romme presented the paper "System Dynamics at the Design-Science Interface." The authors argued that the academic success of system dynamics has largely been accomplished by positioning it as part of mainstream science, but this may now split the field into two disconnected segments, one for practitioners and the other for academics. According to the authors, these two forces are a product of the tension between the competing goals of design and science:

relevance of applications and rigor of analysis. While practitioners are hard pressed to apply the method to enhance organizational effectiveness, academics struggle in a “publish or perish” environment, and must seek out and conform to specific scholarly interests and norms.

How can a healthy coexistence of practice and academia be maintained? The answer: by being determined to stay at the design-science interface! The paper discusses how this can *and has* been accomplished. It traces the success of system dynamics in its struggle for both relevance and rigor, highlighting each step along the way. This is an interesting argument that underscores the major phases and the most relevant work in both domains of our field. It is an invitation to continue this discussion through modeling. Henk and Georges crafted the initial loops of this dilemma and invited everyone’s contribution.

Jim Hines presented an alternative viewpoint, entitled *Modeling at Conversation Speed*, asserting that the current slow speed of modeling is what consigns system dynamics to science and not design. This limitation undermines practice even more than academia. Excellent practice in the field (e.g., Pugh Roberts) has been pushed in the direction of large-scale models, carefully calibrated and validated, sacrificing design for prediction and retrodiction. In fact, according to the presenter, it is academia that has been able to focus on design. This is where parsimonious models aimed at policy insight found their place.

How can system dynamics be used for design in the world of practice? The answer: by increasing the speed of modeling by ten to 100 times! Since it is not reasonable to slow down the managerial process, then the alternative is to speed up modeling to keep up with conversation. Jim described how modeling technology has significantly changed since the 1960’s, becoming more efficient and interactive, and how with a few more advances it will be possible to speed up the whole process just enough for modeling to keep pace.

The two arguments presented the following puzzle: Is the pursuit of relevance really at odds with rigor? Where’s the leverage, in the philosophy embraced by the field or in the methods and technology applied? While these two views addressed these questions differently, both shared in the concern that system dynamics *should* be focused on the design of improved organizational form and policies, just as originally conceived by Jay Forrester. If one has to

do with compass, and the other with velocity, then *both* are useful to go from point A to point B.

Aldo Zagonel

Outstanding Applications

This plenary session showcased the power of system dynamics as a tool for tackling such diverse challenges as facilitating chronic health care planning in Washington state, automotive product development strategies at Toyota, and theory-building in the area of risk misperception and erosion of security compliance.

In semi-rural Whatcom County, Washington, Jack Homer and Gary Hirsch have worked with community leaders to improve care for diabetes and heart failure patients. Their model projects costs and benefits and identifies resource planning strategies over a twenty-year period. The modeling process has also enabled community leaders to forge a consensus regarding goals and evaluation for this program, as well as lay the groundwork for a broader chronic care program.

Building on their extensive experience in analyzing Toyota’s automotive product development process, David Ford and Durward Sobek have developed a system dynamics model that reveals how the Toyota strategy works and why it succeeds. Toyota outperforms competitors with an unconventional product development strategy that keeps alternative design options alive much longer than industry standard. The model combines system dynamics and real options theory to demonstrate how a competitive advantage emerges from the Toyota strategy.

Security systems are high priority in many organizations these days, yet cost-effective security is difficult to sustain. Breakdowns occur. Human compliance erodes. At Agder University College in Norway, Jose J. Gonzalez and Agata Sawicka are developing system dynamics models in which the driving mechanism for erosion of compliance is misguided learning due to misperception of risk. The model replicates the oscillating reference pattern that characterizes organizations that drift into complacency, overreact to danger signals, and then resume a drift that reflects unrealistic risk assessments.

Jonathan Coyle chaired this interesting session, which vividly demonstrated the range of issues within the domain of system dynamics and the variety of purposes that system dynamics modeling can serve.

David Wheat

Economics and System Dynamics

This plenary session was well attended, even coming as it did on the second day of the conference when many people started thinking about taking a little time to explore New York City. Khalid Saeed moderated the session and the panel consisted of Mike Radzicki, Glen Atkinson and John Shilling.

The session was aimed at examining the divergence and overlap between system dynamics and economics. This was one of a number of sessions that was devoted to bringing in folks familiar with system dynamics, but not necessarily practitioners, to discuss the relationships between their fields and system dynamics. John Shilling has spent most of his career working as an economist in academia and as a research economist with the World Bank. Glen Atkinson is a Professor of Economics at the University of Nevada, Reno and Mike Radzicki is a system dynamicist with formal training in economics.

The authors all took the long view and examined the development of economic thought from its beginnings to current philosophies. All the presenters emphasized that economics has shifted from descriptive techniques for explaining economic activity to mathematical techniques. These mathematical techniques now dominate the field of economics and are powerful tools for examining different economic theories. However, the authors pointed out that the price of mathematical rigor is often an oversimplification of the complex problems examined. The authors in this session argued that common ground exists between economics and system dynamics that could lead to fruitful results for both fields.

Rod MacDonald

Teaching System Dynamics

The Teaching System Dynamics parallel session was a combination of papers that encompassed teaching system dynamics at a university, the application of system dynamics to examine problems in an urban school district, and a set of small models used to show policymakers the types of lessons that could be learned from a system dynamics intervention.

The presentation by Hakim Remita and Michel Karsky, "Teaching System Dynamics in a French Engineering School," provided background on the school and students to whom they taught system dynamics. Remita and Karsky were able to effectively show how their students performed by showing examples of their students' work. The

student projects presented examined topics as diverse as competition between ant colonies and the dynamic issues facing a start-up software company. These examples captured the high quality of student work as well as the diverse interests of the students. Remita and Karsky's success in teaching system dynamics is achieved by engaging students in projects of their own choosing.

Don Morris (his paper is titled "Peer Influence in Educational Reform: A System Dynamics Approach") works in an urban school district in Florida and presented a system dynamics model that examined school performance, peer influence and the economic integration of schools. Dr. Morris' presentation showed how system dynamics could be used to explicitly state a pre-existing theory examined in the education literature.

The presentation by Rod MacDonald, "Lessons from Simple Stock and Flow Models," highlighted three models the author uses to convince clients in government agencies of the utility of using system dynamics models to analyze public policies. His examples were tied to very small models developed to address specific issues faced by different agencies.

Vedat Diker

Economics Roundtable

More than 30 system dynamicists – amongst them Jay W. Forrester, the founder of the field – followed WPI's Mike Radzicki's call for an Economics Roundtable at this year's conference. Initially, the discussion concentrated on the question of whether economics activities within system dynamics should be bundled into a formal chapter or a special interest group (SIG) of the Society. It was agreed that such a formalization would greatly enhance the visibility of economics in the field of system dynamics, and also would allow for ease of approaching economists outside system dynamics. Working with economists ignorant of system dynamics and demonstrating what system dynamics can offer regarding formulating and understanding economic issues was identified as a major aim. One advantage of system dynamics named is that system dynamics secures analytical rigor despite not following a neo-classical approach (i.e. focusing on real-world economic problems).

Another idea discussed at the Economics Roundtable was to publish either a book or a special issue of a journal dedicated to economic applications of system dynamics. Also, many attendants spoke in favour of a focused website about economics and system dynamics. With the help of this website, the quality of economic system dynamics models could be

raised due to interaction with other members interested in the issue. It could also be used to prepare public relations activities, for instance media reports, teaching, and consulting in the political area. With measures like these, the dominance of the neo-classical school in economics could be weakened in order to allow for more pluralistic and heterogeneous approaches to economic issues.

Andreas Größler

Military Roundtable

Around 20 participants attended the second Military Roundtable discussion following from the first such session held at the conference in Palermo last year. Alan McLucas led a discussion covering two main themes: opening a debate on the sharing of knowledge between modelers and improving model ownership by military decision makers.

Both topics were covered with some lively debate. It was suggested that sharing of knowledge could include the development of an annotated bibliography and a model library. Participants agreed that commercial and security issues could limit this although there are many examples of military-related system dynamics work in the open literature. The establishment of model libraries is likely to include these issues and there was a debate on the reusability of such models.

A military model lifecycle can vary from the “dispose after use” model for immediate issues to planning tools developed and used on an ongoing basis. Alan stressed that these latter models are difficult to maintain since the military decision makers have high turnover rates (postings being part of their career pathway). Familiarity with the modeling approach appears to be a factor and Alan outlined the depth of system dynamics awareness that military officers receive through the military training establishments in Australia as a way of addressing this.

The meeting proved a useful opportunity to share experiences and there will be a third session in Oxford next year.

David Exelby

Fisheries

A trio of papers about the application of system dynamics to fisheries was presented in a parallel session. Topics discussed were a model of the Thai shrimp aquaculture fishery including politics and pollution (“Boom and Bust Shrimp Aquaculture: A Feebate Policy for Sustainability,” by Steven Arquitt,

Honggang Xu and Ron Johnston); a biological model of the Northwest Pacific rockfish fishery (“A System Dynamics Model of the Pacific Coast Rockfish Fishery,” by Wayne Wakeland, Olgay Cangur, Guillermo Rueda and Astrid Scholtz); and a general discussion of system dynamics applied to complexity in fishery management (“A Basis for Understanding Fishery Management Complexities,” by Richard Dudley).

Arquitt used system dynamics to test a taxation policy to improve the Thai shrimp aquaculture industry: Namely, could the shrimp fishery adopt an economic incentive, a “feebate” or tax, to induce Thai shrimp farmers to locate their aquaculture facilities away from coastal regions instead of along the coast? The Thai shrimp fishery had been established along coastal regions near mangrove forests that provided nutrition and ecosystem cleansing benefits. The farms expanded along the coastline when the earlier coastal locations became unproductive, when the surrounding ecosystems became polluted, and world shrimp prices rose dramatically. Since these coastal locations were “commons” property there was no responsible authority to manage them.

In an effort to encourage farmers to move the shrimp farms further inland onto land actually owned by the farmers (thus avoiding the “commons” problem) a market incentive in the form of a tax on shrimp products was imposed on all growers in coastal regions and in inland regions: The plan was that later this tax would be refunded only to the inland farmer to serve as a financial incentive to encourage the inland location. System dynamics simulations indicated that this tax could encourage the use of inland locations and smooth out the severe economic oscillations in the Thai shrimp market price.

Wakeland presented an analysis of the localized yellow rockfish fishery from the Northwest US, concentrating particularly upon the balance of forces between the carrying capacity of the biological system and the fishing effort and technology. The analysis was prompted by a decrease in groundfish revenues of 70-80% in the Pacific Northwest.

A variety of factors were tested for sensitivity analysis as to their effect upon the total gross rockfish revenue: the natural mortality rate, bycatch rate, average vessel capacity, spawner rate, normal fishing rate, maturation time constant, and others. Of these, the critical controlling variables were the spawner rate and the maturation time constant (from 2 to 6 years) for the fish stocks. A maximum harvest of 40% of the stock per year was found to be the

required level for long term stock sustainability. Simulations were tested successfully against data using biological and fishing factors. The next step is to include feedback from the economic and revenue sectors.

Richard Dudley used system dynamics to sort through the broad questions and complexities of fisheries management. The record of world fisheries shows rampant over-fishing: 33% of commercial stocks and 80 species threatened with extinction from North American waters – even with a regulatory system based upon considerable scientific expertise. Nevertheless, over-fishing is linked to the complexity of the process: feedback loops that are not taken into consideration in the decision making process, violation of regulations, time delays for stocks to come to equilibrium after a management action, the appearance of excessive over-fishing before over-fishing capacity becomes apparent. Management perceptions of stock may be too optimistic and failure can follow good intentions. A holistic approach encompassing biological, political, social and economic conditions is required, including delays in recruitment, effects on stock size, addition of vessels and new gear and efficiencies.

Success is viewed by management as maintenance of high stock levels; by the fishermen as whether they can get an adequate catch per unit of gear and effort; and by the politicians as whether this year's catch is as good as last year's. To understand the behavior of the overall biological fishery system and the impacts of management policy, simulations were made with variations in fishing vessel numbers, gear modification, monitoring the stock, changes in fish growth rates, and recruitment rates. Simulations derived from these inputs to the model are made to demonstrate the relative importance of these factors.

The opportunity to hear these three papers in a single session was most instructive since they each approached the fisheries issue using different stocks, oceans and approaches. Similar to the story of the blind men and the elephant, a deeper understanding of complexity is achieved through the application of several points of view.

Henry Cole

Telecommunications

The telecommunications session I attended consisted of three good papers, characterized by a business/industry-oriented approach.

The first one, presented by Rutger Mooy and co-authored by G. Valk (TNO Telecom, NL) was titled

“Why Customers Choose Your Product: A System Dynamics Approach to Customer Choice Modeling.” The paper focused on modeling customer behavior in telecom markets and was based on a real case-study from the Dutch telecommunication industry.

In order to explain the churn phenomenon, a model was built by the authors to focus on what they call the “price cascade.” This is an interesting concept to start a dialogue with managers who are not accustomed to the system dynamics method. The “price cascade” describes how customers deal with prices and related factors and does not contain any loops. The cascade is made up of different steps, which are set up in such a way that they can be examined qualitatively and estimated quantitatively and individually. Such a concept is particularly useful to explore customers' perceptions of different product-service factors, so it is helpful to give a weight to the different factors in the model. Examples are provided and discussed on how to implement such a concept in system dynamics modeling.

The second paper, presented by Douglas Franco (CANTV, Interconexion, Venezuela), was titled “Modeling the Telecommunication Market.”

The author was very clear in his explanation and some relationships (e.g. churn modeling) with a number of issues modeled by the first presenter were found and discussed during the session. In particular, the author explained how, in order to understand the telecom industry's complexity, a system dynamics model of the telecommunication market was constructed. In the model it is shown how customers choose among alternatives, and mobile and fixed operators grow, merge, offer services and set prices. Regulators control prices for call termination and fixed telephony. The model generates profits, levels of consumption and surprises. A Calling Party Pays billing practice is assumed, but it is easy to adapt the model to RPP (Receiving Party Pays) billing. The model has been implemented in Vensim with data gathering in Microsoft Excel linked to corporate databases.

The third paper, presented by Oleg Pavlov (Worcester Polytechnic Institute), was titled “Using System Dynamics to Assess Economic Feasibility of Satellite-Augmented Cellular Networks”. Also this paper raised the interest of the audience. It was well presented by the author, who focused his analysis on a counterintuitive behavior that was experienced in real company contexts.

Computer experiments reveal that in the early stages of market development by augmenting its network

with satellite capacity a cellular operator may improve its performance in terms of revenue, subscriber growth rates, profit and other business parameters. As more cellular capacity is deployed, the advantages of integrated systems disappear. The model was analyzed in its different sectors, including cellular infrastructure, satellite, financials, subscriptions, competition, infrastructure cost pricing, and mobile service pricing.

Carmine Bianchi

Psychology

Three speakers spoke in the Psychology Dynamics session. In Harold Kurstedt's talk, he spoke about a free form model in which two individuals have a negative professional interaction due to a reinforcing loop in which misinterpretations lead to negative behaviors that encourage negative reactions. In this case, one individual must consider alternative interpretations and change behaviors in order to turn a vicious cycle into a virtuous one.

The second talk, by Rohita Singh, was an entertaining exploration of one's own genius. In this talk, that foreshadowed a later workshop, we were asked to consider our pre-conceived notions of genius and investigate our mental filters.

The third talk, by Ralph Levine, involved a system dynamics model of a psychological theory of attitude change presented in the early years of psychology. This theory predicted a particular phenomenon in which the relative location of one's prior attitude and the message presented about an object dictated whether change would be toward the message or away. Ralph was able to replicate findings and discover intriguing new ones in the application of his model.

Three speakers and one discussant spoke in the Psychology Symposium. John Flach focused on the cues used to compare current state and desired state, in order to trigger action. His example was the collision of a baseball and a bat. The result of his extensive empirical work was that a batter pays attention to the change in visual angle to the ball, rather than to its absolute distance from home plate or its speed coming toward it. From plotting these data, he was able to show that it is more difficult to hit a slow ball after being accustomed to fast ones, than to hit a fast ball after being accustomed to slow ones.

Alex Kirlik critiqued the exclusive focus by psychology on cognition without action, and revived an early model of Tolman and Brunswik in which

cognitions and actions are integrated. In the course of describing ecological psychological approaches from Brunswik and Gibson, he showed his own model, and described empirical research on how airplane pilots can use simple heuristics to taxi around O'Hare to the appropriate gate, even in fog.

Jim Townsend spoke about a matrix model with feedback, the Field Theory of Dynamic Decision Making, for predicting decision processes over time. He showed how odd empirical findings from decision-making could be accounted for by a single model with a kind of co-flow structure in which alternative decision preferences compete over time.

Finally, John Sterman spoke about how psychology works in smaller time spans than typical system dynamics models, but system dynamics practitioners should put more attention to the functioning of the comparator process (current vs. desired state) and to the link between cognition and action.

Elise Weaver

Group Model Building

The three papers in this parallel session explored the ability of group model building to change mental models and behavior of participants. Approximately 50 people attended the session. Two papers discussed how best to elicit mental models from group model building participants and one paper proposed a framework to evaluate its effectiveness for changing mental models and behavior.

Jeroen Struben presented the paper entitled "The 'Standard Method': Scripts for a Group Model Building Intervention," co-authored with Peter Otto. Struben and Otto described an application of Jim Hines' "standard method" for examining possible consequences of establishing a fish processing facility for the Gloucester fishery. They argued that the standard method provides a guided but flexible framework that allows insights to emerge in the process of working with clients. In particular, they found the scripts used in the initial stage of the process, combining "hope and fear" scenarios with dynamic hypotheses, made the system structure and behavior clearer than a reference mode. Aldo Zagonel, in "Using Group Model Building to Inform Welfare Reform Policy-making in New York State: A Critical Look," described a very large, multi-group, multi-level GMB application to understanding the consequences of welfare reform in New York State. He also stressed that the process was an emergent one and raised the question of how to best structure the process to help insights emerge. Zagonel made several observations from the study:

the structure of the model emerges from alignment of group mental models; it is important that parameterization of the model draw on expert judgement; participant learning comes from live policy experimentation; checking model behavior against actual behavior helped build participant confidence; and it was important that discussions emphasize implementation.

Finally, Etiënne Rouwette addressed the lack of evidence for the effectiveness of group model building in a paper co-authored with Jac Vennix (“Process and Outcomes of Modeling: An Attempt at Formulating a Conceptual Framework”). Rouwette and Vennix proposed a conceptual model for evaluating effectiveness of group model building interventions and applied it to five case studies. As Rouwette noted, Jay Forrester’s goal for system dynamics is to change system functioning by changing mental models and ultimately behavior of the people exposed to system dynamics. Rouwette and Vennix, along with the other authors in this session, believe that group model building has the potential to change mental models of participants through the process of model building. Based on their evaluation framework, they concluded that such interventions do support the mental model and behavioral change that Forrester and other system dynamics practitioners are hoping modeling will achieve.

During the question period, one audience member asked whether it would not be better to start by having individuals in the group build their own models, because the literature on problem-solving groups says the outcome of a group decision will not be as good as a given individual view. The response, that individual models would get people embedded in their own views, exemplifies the theme of the session: a key value of group model building is its ability to bring participants to a shared view through the process and the model generated is often less important. Developing consensus around a group mental model is an emergent process, building awareness and confidence in participants.

Krystyna Stave

Letters from Conference Participants

“As a first-time attendee I learned a lot at the conference. Hopefully in the near future we can begin an occupational safety group in the Society.”

Fazel Hayati

“I’ve enjoyed it so much, and the city itself was simply exciting!”

Tasso Perdicoulis

“The NYC conference was spectacular. The quality of the program speakers, papers and posters was universally higher than I ever remember. I also am very excited that the Society is reaching out to other disciplines, like the psychology track, that truly broaden and enrich our field. I met more new people doing more new applications than I had before. I believe this is very good for the Society. Moreover, I learned new ideas from new people and deepened my understanding of the areas I am familiar with by listening to the senior statesmen and the next generations. I look forward to continuing my work to contribute and expand the field with my efforts. The bar has been raised yet again for next year!”

Hal Rabbino

“All of us learned a great deal from this conference, and had the opportunity to meet many good people.”

K. Raman

“Several people came up to me after the Business Roundtable and said how much they got out of the event. Each contribution was valuable and the audience undoubtedly benefited. We heard from several quarters how difficult it is for untrained people to grasp stock-and-flow thinking and how strenuously people can resist insight from system dynamics work. The keys to making system dynamics more accessible are embedded in the experience of successful practitioners such as the panel members. While it’s important to hear advances in research, it’s perhaps equally or even more important that system dynamicists learn how such researches are put to use. So I think the Business Roundtable should get a higher billing in future conferences.”

Jim Thompson

“I have really enjoyed my first experience in participating in this conference and meeting nice and caring people. I have benefited from attending the different sessions and workshops, specially the modeling assistance workshop. I am sure I will try my best to attend and participate in next year’s conference in Oxford.”

Lina Al-Qatawneh

“We all enjoyed ourselves, whether it was academic discourse or socializing. Great conference in a great city.”

Brian Dangerfield

Chapter News

Our Chapters are growing! The Society currently has eleven chapters: Australasia, Brazil, China, Egypt, Hellenic, Italy, Japan, Korea, Latin America, Student, and the United Kingdom. To find Chapter reports and contact information, please visit http://www.systemdynamics.org/society_activities.htm.

There are currently three Special Interest Groups: Education, Environmental Dynamics and Health Policy. Contact information is listed on the website.

For information on how to start a chapter or special interest group, please contact Ginny Wiley, VP Members and Chapters, at ginnyw@pegasus.com.



The Student Chapter gathered at the New York conference

Australasia

The Australasian chapter meeting took place at the 21st International System Dynamics Society Conference in New York on the 21st of July, 2003. It was attended by about 10 members of the chapter. The outcomes from this meeting can be summarized in the following key points:

- 1) Dr. Gabriele Bammer of the Australian National University and Harvard University is coordinating a bid for the ARC Network Grant on Integration and Implementation Sciences. This will bring together researchers developing theory and methods to deal with complexity, uncertainty, change and imperfection in order to integrate across disciplines, 'knowledges,' cultures and organizations. It will also seek to bridge the gap between research and its implementation in policy, services and practice. These approaches will build on systems thinking, participatory methods, complexity science, diverse epistemologies, inter- and trans-disciplinarity, and a host of undocumented methods.
- 2) The Australia and New Zealand Systems (ANZSYS) conference is set to take place in Melbourne, Australia on 18-20 November 2003. This conference brings together delegates from a diverse range of backgrounds who span the systems fields. System dynamics

will be strongly represented as a discipline at this conference with Tim Haslett, Monash University and Rod Sarah, Organisational Development Officer, Monyx Pty Ltd, co-chairing the conference. All are welcome to attend. See <http://www.monash.edu.au/oce/anzsys2003>.

- 3) The chapter positions for the region were reviewed in light of the appointments of Bob Cavana as Vice President (At Large) and Tim Haslett to the SDS Policy Council for the term 2004-2006. Candidates suggested for the chapter positions in the near future are as follows:
 President: John Barton (carrying on another term)
 Secretary/Communications: Daniel Jarosch (replacing Peter Galbraith)
 Chapter Representative to Policy Council: Rohita Singh (replacing Bob Cavana)
 The above positions hope to be finalised at the chapter meeting in November at the ANZSYS conference in Melbourne.
- 4) Rohita Singh is coordinating monthly/bi-monthly Geniusys learning labs. These are 1-2 hour meetings to bring together system dynamics researchers, practitioners and clients from across Australia and New Zealand to network, share knowledge and build skills in the system dynamics community. The content of these sessions will alternate between research projects and commercial training/applications of system dynamics in the field.

- 5) Alan McLucas, a Senior Lecturer in the Australian Defence Force Academy at the University of New South Wales in Canberra, plans to coordinate a bid for the 2006 International System Dynamics Conference. This bid will draw strongly from the skills and knowledge built from running the conference in Wellington, New Zealand in 1999.

All the best from down under!

John Barton, Bob Cavana and Rohita Singh

Brazil

A brief report from the Society's newest chapter:

From September to November 2002:

*First discussions about system dynamics with an average of 10 participants

*Prof. Pierre Ehrlich contacts the System Dynamics Society and learns of other people and previous efforts of Prof. Romeu Telma of UFPR to create the SBDS

*Creation of Spanish-language discussion list (dinamicadesistemas@grupos.com.br)

From December 2002 to February 2003:

*Group expands to 25 members (or soon to become members) of the SDS and 25 other people interested in the field

*10 members support the creation of the Chapter

*Chapter enters the agenda of the Winter Policy Council Meeting

*First meeting to organize the administration of the Sociedade Brasileira de Dinâmica de Sistemas (SBDS) and create its statutes

From April to July 2003:

*Voted the board of directors for the Brazilian society composed of:

Presidência: Pierre J. Ehrlich ehrich@fgvsp.br

Vice Presidência: Romeu R. Telma

rtelma@ceppad.ufpr.br

Vice Presidência: John Edwin Mein

john@aennova.com

Conselheiros:

José Augusto Corrêa jacorrea@fgvsp.br

Niraldo José do Nascimento niraldoj@aiiec.br

Hélder Leal da Costa helderlc@uol.com.br

Edmilson Alves de Moraes edmilson@fgvsp.br

Júlio Figueiredo jbastos@espm.br

Idaci de Souza Mendes idaci@sinergia.etc.br

Leonardo M. Reis leonardo@aennova.com

*The party obtained 30 votes in its favor

July 2003 and beyond:

*Next steps include the creation of regional groups and organizing the first SBDS conference.

Paulo Gonçalves

China

The Eighth Chinese National System Dynamics Conference in 2002: The 2002 Conference of System Dynamics was held at Zhejiang University on October 10-25, 2002. The conference organizers were Professor Qingrui Xu and Professor Jin Chen, Research Center for Innovation & Development, Zhejiang University.

More than 40 participants focused on solemn and impassioned academic communication. They came from everywhere in this country. They were teachers from universities, members of research institutes and managers of enterprises. Especially, more than 50% of the representatives are young people.

The conference chair was Professor Qifan Wang of Fudan University, President of the Chinese System Dynamics Research Committee, and of the Chinese academic committee of Systems Engineering. The participants also included the following council members: Professor Qingrui Xu, Zhejiang University; Professor Ren'an Jia, Nanchang University; Professor Guangle Yan, Shanghai University of Science & Technology; Professor Jin Chen, Zhejiang University; Associate Professor Xiandong Zhang, Fudan University; Associate Professor Hong Liu, Shanghai Maritime University; and Dr. Jianguo Jia, Shanghai Bell Company Ltd. Dr. Feng Lee Lin of National Sun Yat-Sen University from Taiwan also attended the conference.

The conference theme was "Changing Managing and Organization Dynamics in the 21st Century". The conference papers covered systems thinking, system dynamics modeling, business management, technological innovation, high-tech industry development, urban housing, regional logistics planning, project management, and more.

The participants suggested that the future development of system dynamics should focus on two aspects. On the one hand, studying system dynamics theory should be strengthened further, especially combining system dynamics with complexity theory. On the other hand, cooperative research should be enhanced, especially the collaboration between the Mainland and Taiwan.

Chapter Priorities: Setting up a structurally reasonable team is the priority task facing the Chapter. System dynamics materials – writing and promotion of new software – is the other urgent need. System dynamics materials are supposed to be re-edited based on the original ones; Vensim and the other new software are worthy of being promoted in China. Developing a bigger research project can earn system dynamics and the Chapter a wider reputation. In addition, more flexible kinds of communication activities should be encouraged. A nationwide System Dynamics Committee Interactive

Meeting can be held twice a year to encourage regional communication and enroll more researchers.

In January 2001, Tongji Development Institute was established as a research base for system dynamics at Tongji University in Shanghai. It is open to widely attract scholars and experts from the international system dynamics field and is involved in many projects, such as the economic long wave in China.

Studying system dynamics theory should be strengthened further, especially combining system dynamics with complexity theory. We believe that system dynamics will continue to be one of the main tools in solving complicated work in theoretical research. The common tools are not enough to solve a non-linear, multi-feedback situation. System dynamics should be applied with other methods (complexity theory, economic control theory, game theory and other systems approaches) to avoid the limitation brought by using one method alone. Application development should still be the focus of system dynamics with the most important topics covering industrial adjustment and development, macro-economic adjustment, regional planning, enterprise strategy, environment protection and sustainable development.

The 2004 National System Dynamics Conference will be held in Shanghai.

The 2005 Pacific-Asia International Conference of System Dynamics is suggested to be held in SE China (in Mainland, Taiwan or Hong Kong) in Fall.

Qifan Wang

Japan

We have a monthly research meeting, where principally five study groups report one by one. They are:

Model Validation Study Group, focusing on validating system dynamics models built by Professor Shimada during the seventies;

ST/SD Educational Database Project, focusing on developing the educational material database of systems thinking/system dynamics as well as developing materials and sample system dynamics models for systems thinking/system dynamics education in school and university classes;

Business Process Dynamics Study Group, focusing on the study of business process dynamics and business process modeling;

Environment Study Project, focusing on the study of environmental issues using system dynamics models; and finally

Decision Making Study Group, focusing on the study of the dynamics of decision making.

The *Business Process Dynamics Study Group*, whose leader is Professor Michiya Morita, had a seminar on March 19th, 2003 at Chuo University, Tokyo, which led to the special topics of the Japanese Journal of System Dynamics (chief editor: Professor Yasuo Matsumoto) published as the third volume in May, 2003.

We had also the Third Management Forum for the New Century, "Collaboration of Government, Citizen and Company toward a Circulative Society," on January 15th, 2003 at Chuo University, Tokyo. Professor Hidenori Kobayashi, JSD President, gave a keynote speech, "System Dynamics as a Tool for Collaboration." He published a new book, *Dynamic Perspectives for General Policy Studies: Excel System Dynamics*, in 2002.

At the ISDC 2003 in New York Professor Morita and Mr. Toru Suetake, JSD Director, hosted the Japanese Chapter Meeting Session, where two Japanese MIT students joined also.

Hironori Kurono

Korea

The Korean System Dynamics Society Chapter was established in 1999. Since then, a system dynamics academic conference has been held twice every year, during the spring and fall season.

The *Korean System Dynamics Review* was first published in 2000 and since then, the journal has been published twice every year. We are currently preparing to publish this year's volume (Volume 4, No.1).

The chapter's current membership has reached some 141 people as of 2003. The members are professors at the university, researchers at the research institute, graduate students, and field practitioners such as nurses, in the order of majority. Active members are some 30 scholars scattered all over the country. Major research areas of these members are public administration, business administration, transportation, urban and regional policy, and energy study. Some teachers in the middle schools are also joining the chapter even though the numbers are few.

The current president of the KSDS is Taehoon Moon, Dept. of Urban and Regional Planning, Chung Ang University, PhD from the University at Albany. The president of the KSDS for 2004-2005 will be Dr. Ahn Namsung (senior researcher at the Korean Electric Power Research Institute). He was elected as the next president at the general meeting of the spring academic conference of 2003.

Only a small number of people attended the International Conference this year. But the KSDS is

expecting more Korean system dynamicists will attend the Oxford conference in 2004.

Taehoon Moon

Latin America

The Latin American Chapter (LAC) of the System Dynamics Society has been very active during the year 2002-2003. Gloria Perez and her team at the Monterrey Institute of Technology, Mexico, organized the first Latin American Conference, where over 40 papers were presented, and four plenary sessions took place. Almost 150 people from Mexico, Colombia, Chile, Ecuador Brazil, the USA and the UK attended the conference. The social program included a Mexican evening with delicious food from the region and some tequila on board. The next LAC conference will be held in Santiago, Chile, in November 2004. All members of the System Dynamics Society are welcome to try the LA touch to system dynamics.

The presence of the LAC at the NYC conference was very prolific. About 20 representatives from Latin America (Colombia, Mexico, Venezuela, Uruguay and Ecuador) attended.

The LA chapter, with the support of the Vice Rector Enrique Zepeda and Gloria Perez of the Instituto Tecnológico de Monterrey, is preparing a proposal to hold the 2006 ISDC at one of its campuses near Mexico City. For those who remember the Cancun conference, this will beat it!

At business meetings in Monterrey and NY, the LAC decided to focus on promoting the diffusion of the field in the sub-continent. In this direction several actions are being undertaken: conferences, implementing a website, re-installing an electronic list and promoting publications in Spanish. Among other activities: a) in November 29, 2002 the first Colombian mini-conference was held in Medellin, Colombia, where almost 20 papers were presented; and b) the system dynamics electronic list in Spanish is back on line with some interesting discussions taking place.

Isaac Dyner

UK

Summer 2002 Event: Held at London Business School. John Morecroft and Kim Warren gave separate talks at an event themed as "Embedding Dynamic Thinking within Business." Successful and well-attended.

Harrogate Event (February 2003): Attended by 61 persons. David Andersen facilitated a session on developing future chapter activities in addition to

presenting a talk on "Using Group Model Building to Support Public Policy Development." Brian C. Dangerfield held an induction/problem solving session for those new to system dynamics; about 10 people attended.

Other Activities: Apart from the usual February event at Harrogate, a session in conjunction with the SD+ group of the UK Operational Research Society on defence applications took place in late summer 2003. Possible collaboration at an autumn event with the International Council on Systems Engineering.

Current Membership: This is presently 67.

Meetings of U.K. Chapter Policy Council: Including the meeting at the New York conference, we have met five times in 2003.

Brian Dangerfield

Education SIG

The Education Special Interest Group is very enthusiastic about advancing the theory and practice of system dynamics in our particular domain. We are pleased to be part of this new thrust of the Society to broaden the understanding and application of system dynamics through the formation and support of Special Interest Groups.

In response to requests from our K-12 colleagues, the Higher Education SIG moved immediately to become the Education SIG, or E-SIG, spanning all levels of education, in recognition of our inter-connections and shared interests. The Society also encourages us to seek out people who are not members of the Society but who share our education interests to invite them to join our efforts.

Michael Kennedy, of Southbank University in the UK, and Programme Co-Chair of the 2004 International System Dynamics Conference, has begun the development of an E-SIG website which will serve as a point of contact for all who are seeking information about system dynamics applications to education, or who want to join the E-SIG. The new E-SIG website is located at <http://www.ukds.org/esig/index.htm>

The main concern of the E-SIG is to encourage the development of system dynamics theory and applications useful in the education domain. We are working toward applications relating to enrollment demand; teaching practice; teaching quality; human resource management; planning, budgeting and management; governance; endowment spending policy; and the external forces shaping the outlook for education. We have a particular interest in developing systems approaches to the creation of the infrastructure which is an essential prerequisite to any privatization of educational institutions.

As it develops, the E-SIG website will become a place to locate information and identify resource people. Please let us know about any work you have done in the education domain or work done in other domains that could be applied or adapted for use in the education domain that can be referenced on our website.

Most exciting, we are planning our Second International Workshop on System Dynamics Applications to Education, to be held on July 30, 2004, the day after the annual SDS Conference at Keble College, Oxford, England, next year.

If you have current or prospective interests in the education domain, please become a member of the E-SIG simply by visiting the website. Above all, plan to join us at the workshop on July 30, 2004.

Carol Frances and Michael Kennedy

Environmental Dynamics SIG

The Environmental Dynamics Special Interest Group (ED SIG) was constituted in November 2002. The group is concerned with sustainable development and focuses on systems that feature both human activities and natural environment – also known as “environmental systems.” The objective of the group is to investigate the dynamics of the systems of interest, and optimize the study and control methods in such systems. The group aims to become an internationally networked leader in sustainable development, featuring a distinct tradition of scientific research and conduct inherited from system dynamics – which will probably evolve as the “environmental dynamics paradigm.”

In its inaugural year, the group counted 57 members from many different countries and professional orientations. International networking has also started positively, counting a strategic partnership with the Sustainability Institute (<http://www.sustainabilityinstitute.org>), indexing by the Sustainability Web Ring (Sustainable Development Communications Network), and several links in relevant professional databases and institutions. The membership and partnership campaign shall continue strongly in the near future.

The group’s presence on the web, marked now by a simplified website, <http://home.utad.pt/ed/>, offers international visibility to the group, and serves as a repository of useful references and material (new articles, modified versions of previously published material, or reprints of older publications) for those who are working on sustainable development. Two major efforts toward controlling the

quality of the information handled by the group are (a) an Editorial Board by peer reviewers and (b) an archiving system for keeping order in the group’s documents.

The plan of activities for the group starts with building a knowledge base on the dynamics of the systems of interest from case studies – we are exactly at this phase right now. When conditions permit, the group shall draw relevant generalizations – e.g. in the form of articles – on the nature of the systems studied as well as on the methodology used. With adequate maturity in its record, the group should be able to issue recommendations for best practice in sustainable development, functioning thus as a type of an Expert Group. Finally, the group shall always – starting right now – stimulate and direct methodological and technological advances in sustainable development through R&D projects.

The group communicates principally through electronic mail, discussions at sdsustain (to join the list, see <http://pobox.une.edu.au/mailman/listinfo/sdsustain>) and through the all-important annual meetings at the SDS conference. The first ED SIG administrative meeting (July 2003, NYC) resolved the group’s major issues regarding governance, while the following Open House session helped warm up the ambience for this coming year’s work. Finally, the group communicates with the Society through the Policy Council meetings, the Annual Report to the Society (see the first report at http://home.utad.pt/ed/housekeeping/reports/rp0001_anual_2003.pdf), and the Business meetings, as well as through electronic mail when formality is not required.

Anastássios Perdicoulis

Health Policy SIG

Following a roundtable meeting at ISDC 2003 in New York, a Health Policy Special Interest Group (HP SIG) has been formed and approved by the Policy Council. This group will provide a means for the exchange and collection of information related to the modeling of healthcare issues and public health policy, and will develop the Health Thread for ISDC 2004 in Oxford. We also anticipate the group will become a vehicle for active collaboration on health system dynamics projects of international significance and for promoting the system dynamics approach to the wider health community.

The HP SIG is open to all Society members and others who would like to be included in our e-mail distribution list and a planned web discussion/information board. To join, or for more information or suggestions, please contact Jack Homer (jhomer@comcast.net) or Geoff McDonnell (gmcdonne@bigpond.net.au), interim co-chairs.

Jack Homer and Geoff McDonnell

Announcements and Calls for Papers

***System Dynamics Review* Special Issue: Dynamics of Supply Chains and Networks**

The *System Dynamics Review* intends to publish a special issue focusing on the dynamics of supply chains and networks. The issue will be edited by Henk Akkermans and Nico Dellaert of Eindhoven University of Technology and is tentatively scheduled for volume 21 (2005). Manuscripts may have a quantitative or qualitative orientation and will reflect the general aims of the *System Dynamics Review*. Papers based on methodological issues as well as case studies are welcome.

A list of relevant topics includes:

- Dynamics of collaboration between customers and suppliers and links with performance;
- Influence of market volatility on supply network control policies;
- Dynamic interrelations of new product introductions, product quality, production capacity and customer demand;
- Impact of sharing of end customer demand information on upstream supply performance in volatile markets;
- Impact of market cyclicity on capacity investments; Impacts of relatively new SCM policies such as Vendor-Managed Inventory (VMI) and

collaborative planning (CP) on supply network performance;

--Intended and non-intended effects of new information systems such as ERP and APS on supply network performance;

--Managing divergent product portfolios with shared capacity resources in volatile markets.

Manuscripts will follow the journal's guidelines for main articles. We call for two-page proposals by **November 1, 2003** and we will respond with the invitation to proceed by December 10, 2003. Papers are due April 1, 2004. They are subject to the normal refereeing procedure of the journal, with coordination by the editors. Please submit your proposals to:

Dr. Henk Akkermans, Dept. of Technology Management, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven, The Netherlands (h.a.akkermans@tm.tue.nl), or to

Dr. Nico Dellaert, Dept. of Technology Management, Eindhoven University of Technology P.O. Box 513, 5600 MB Eindhoven, The Netherlands (n.p.dellaert@tm.tue.nl)

Sponsors of the System Dynamics Society

Amber Blocks, Ltd.
 The Asthma 2000 Group and
 Innovative Clinical Systems
 BP
 Frank Davidson
 Decision Dynamics, Inc.
 Delsys Research Group, Inc.
 Jay W. Forrester
 General Motors Corporation
 Georgia-Pacific Corporation
 Hall, Vasil & Dowd, CPA's
 Hewlett-Packard Company
 High Performance Systems Inc.
 HVR Consulting Services Ltd.
 IBM Business Consulting Services,
 Business Dynamics
 ITP Consultores
 MIT System Dynamics Group
 Minase B.V.

Mohaseboon Financial and Business
 Consultants
 Northwater Capital Management Inc.
 PAR-group, Nijmegen School of
 Management, Nijmegen University
 Patni Computer Systems, Inc.
 Pegasus Communications, Inc.
 Powersim Solutions
 Project Performance Corp.
 Proyectos Comerciales de México, SA de
 CV, una empresa de Grupo Proyectos
 Rockefeller College of Public Affairs and
 Policy, University at Albany
 Toshiro Shimada, JSD Chapter
 University of Salford, Centre for
 Operational Research and Applied
 Statistics
 Ventana Systems, Inc.
 Ventana Systems, UK

2004 International System Dynamics Conference, Oxford

The 22nd International Conference of the System Dynamics Society will be held July 25 - 29, 2004, at Keble College in the University of Oxford, England.

Staying at Keble College in the University of Oxford will provide a unique opportunity to experience the heritage and academic excellence of Oxford and the college. With everything on one site and in close proximity, there will be an unprecedented opportunity to network with international friends, colleagues and clients.

Programme

The conference theme of Collegiality is predicated on the notion that as system dynamics is based on what are observed, deduced or presumed to be true causal interrelationships, and not on any particular management, economic or social theory, it is thus intrinsically neutral between these theories. In many applications it therefore offers the opportunity to support open debate and serve as an 'honest broker' of ideas.

The conference will particularly welcome papers that consider the role and potential of systems dynamics in consensus building, conflict resolution, knowledge surfacing and sharing, and theory testing. In addition, submissions are welcomed for work on all topics germane to system dynamics.

Deadlines and Key Dates

- January 2, 2004 Opening date for paper submissions and workshop proposals.
 - April 2, 2004 Paper submission deadline. Workshop proposals due.
 - May 14, 2004 Notification of acceptance.
 - May 16, 2004 Session proposals due.
 - May 21, 2004 Final abstracts due for Printed Abstract Proceedings.
 - May 21, 2004 Early conference registration deadline.
 - June 18, 2004 Conference registration deadline.
 - July 23, 2004 Final deadline for late registrations accepted on a space-available basis (no on-site registration).
 - July 25, 2004 PhD Colloquium, Policy Council Meeting.
 - July 26, 2004 Oxford Conference Opening!
 - August 27, 2004 Deadline for final paper versions for CD-ROM Proceedings.
 - September 2004 CD-ROM Proceedings mailed to conference registrants.
- For updated details, please visit the Society website at: <http://www.systemdynamics.org>

Publication and Contact Information

The System Dynamics Newsletter is published two times a year by the System Dynamics Society.

Editors: Pål I. Davidsen, Roberta L. Spencer, Jennifer I. Rowe

Many thanks to all who contributed their writing, photographs, and information to this issue of the newsletter: Henk Akkermans, Lina Al-Qatawneh, Yaman Barlas, John Barton, Carmine Bianchi, Bob Cavana, Dean Christensen, Henry Cole, Brian Dangerfield, Pål Davidsen, Vedat Diker, Isaac Dynner, David Exelby, Jay Forrester, Carol Frances, Paulo Gonçalves, Andreas Größler, Fazel Hayati, John Heinbokel, Jack Homer, Michael Kennedy, Hironori Kurono, Nan Lux, Rod MacDonald, Geoff McDonnell, Taehoon Moon, John Morecroft, Anastássios Perdicoulis, Jack Pugh, Hal Rabbino, K. Raman, Rohita Singh, Krystyna Stave, Jim Thompson, Silvia Ulli-Beer, Qifan Wang, Elise Weaver, David Wheat, and Aldo Zagonel.



Please send letters, news, photographs, and ideas for the newsletter to:

System Dynamics Society

Milne 300, Rockefeller College
University at Albany
Albany, New York 12222 USA

Phone: +1 518 442 3865

Fax: +1 518 442 3398

Email: system.dynamics@albany.edu

<http://www.systemdynamics.org>