The CUNY Institute for Computer Simulation, Stochastic Modeling and Optimization

Proposal

Approved by Hunter College Senate on November 19, 2012

By: Felisa Vázquez-Abad and Ted Brown

To: CUNY Board of Trustees

Date: February, 2013
The Institute for Computer Simulation, Stochastic Modeling and Optimization (CoSSMO) will plan and make strategic decisions and execute a portfolio of research projects dealing with computer simulation, stochastic modeling and optimization. The focus for the new Institute will be on the breadth of applications of stochastic modeling and optimization that are a direct benefit to government and private industry. The balance between the resulting pure research and applied problem solving will be achieved through the proposed operational structure. This Institute will not duplicate the work of existing programs or research centers. On the contrary, its proposed structure will naturally lead to active collaboration with the Institute for Sustainable Cities and the Institute for Software Design and Development, among others. The academic disciplines within its scope include: mathematics, computer science, statistics, applied mathematics, business, and engineering.

**Academic and Intellectual Purpose:**

- To provide graduate and undergraduate students an experience that will enhance skills that are important for the workforce, in addition to the experience of conducting research in teams. In simple terms, to provide students with theoretical and fundamental insights supporting the application of computer simulation and optimization to solve real problems within a collegial environment.
- To increase productive research collaborations between CUNY faculty and colleagues, nationally and internationally.
- To create pedagogical material and case studies available to all CUNY faculty and students suitable for undergraduates.
- To increase and promote higher research output and knowledge transfer by identifying common features in the mathematical models of current programs and potential new projects.

**The ORE Principle, three axes for project development:**

**Outreach:** The Institute will manage a portfolio of research projects involving students at all levels and faculty members. The focus will be on projects that are informed by real applications in the public and private sectors. Besides the usual collaborative projects with industry, we envision projects that help develop mathematical and computer skills needed in the workplace. Each project will be validated through the endorsement from industrial partners and/or the Advisory Board.

**Research:** The Institute aims to establish a synergy of research and grant activity between the various colleges of CUNY and outside, focusing on all areas of the application of stochastic modeling, simulation and optimization. It will be very important to implement the Institute’s operations so that different Departments and Faculty members benefit from cooperation, and that they should not compete for resources within the Institute.

**Education:** The research projects will foster interactions among students, faculty and industry members. Projects will be used to create pedagogical material as "case studies", and this will be made available throughout CUNY. Material gathered in this manner may be incorporated for training courses within the Institute. Student internships at partner companies or government sectors and Faculty workshops at the Institute for the partner companies and government agencies will be promoted as well.

**Financial Model:** Funding will come from federal and corporate grants, corporate and private donations, and minimal CUNY support. The Institute will manage student scholarships and support for internships. In addition, it will help to identify and support applications for research funding to its members. Faculty members will approve projects, without the need for industry partners to endorse the value of the research. On the other hand, the Advisory Board will make sure that the theoretical training of students is strengthened and complemented by the development of specific skills that are needed in the work place. Within the first three to five years of existence of the Institute we will seek funding through various government opportunities to secure the basic operational expenses and long-term support for the infrastructure. Members are expected to contribute towards research and indirect expenses through grants, according to the funding rules.
1. GOAL AND MISSION

Goals:

- Synergy between research, education and outreach. The Institute will aim to integrate academic excellence and service to the public and private sectors of society related to problems better solved applying stochastic modeling, computer simulation and/or optimization.
- The operational structure of the Institute will promote research outputs, and it will help create new educational material. It will promote collaborations with the public and private sectors through cross learning and networking, with less work required of the members than working on their own.

Mission:

- To identify potential projects and participants across CUNY and in the community at large;
- to help members identify sources of funding and to prepare grant applications;
- to facilitate the execution of the projects, providing advice, space, and computer facilities;
- to create research programs by aggregating multiple projects with common defining factors. Such programs will promote interactions and networking that will increase the value of the research activities with respect to the contribution of individual projects;
- to manage program projects with core competencies; and
- to establish collaborations outside CUNY (national and international).

2. NAME

CoSSMO: Computer Simulation, Stochastic Modeling and Optimization

3. DEFINITION OF THE INSTITUTE AND THE ORE PRINCIPLE

The activities of the Institute will address the integration of three key dimensions:

- Outreach
- Research
- Education

Activities in the Institute will be defined by applied research projects, each involving one or several academic areas. The portfolio of interdisciplinary programs will be managed through smaller research projects for students at all levels (from first year undergraduate up to postgraduate). Programs will be required to have important academic goals, scientific value and significant potential for application. International scholars will be invited and will be encouraged to share their knowledge with students, via informal collaboration, and one-to-one meetings to discuss their research projects and methodologies. It is often the case that such visitors interact solely with the principal investigators. At CoSSMO we will foster more contact between students (undergraduates as well as graduates) and international scholars.

All projects must have potential applicability in the private or public sector, although not necessarily externally funded, to encourage the development of mathematical and computational new knowledge, as well as the generation of solution methods. The underlying commonality for all projects is the use of mathematical modeling, simulation, and/or stochastic optimization.

4. INSTITUTE GOVERNANCE

Staff: The Institute will function with an Executive Director, a Deputy Director, three Leads, and (possibly part time) Program Manager and IT support person. In addition, the Institute will appoint “Resident Scholars” in emerging technologies, whose value will be to bring cutting edge methodologies and to catalyze the Institute’s activities to promote scholarship. Initially, Professor Felisa Vázquez-Abad will be the Executive Director and Professor Ted Brown will be the Deputy Director of CoSSMO.
Lead for Research. External and International Academic Links. His/her function will be to co-ordinate, monitor and promote collaborations between academics (inside and outside CUNY). Initially Professor Amotz Bar-Noy (Brooklyn College) will be offered the appointment.

Lead for Outreach. Industrial and Public Sector Relations. His/her function will be to co-ordinate, monitor and promote collaborations with industry and public sector. Initially Professor Saad Mneimneh (Hunter College) will be offered the appointment.

Lead for Education. Teaching. His/her function will be co-ordinate, monitor and promote creation of pedagogical material and delivery of specialty courses to industry. (Yet to be determined who will be appointed initially.)

The three Leads will naturally be expected to collaborate under the co-ordination of the Directors. Such cross activities include establishing internships for students, creating specialty courses to industry, and promoting the creation of interdepartmental research programs and teaching material based on research results. CoSSMO will award each of the Leads a research grant (initially of $1000, through the office of the Provost of Hunter College) to help carry out the various responsibilities of the position. In addition, it is desirable that the person acting as Lead benefits from reasonable teaching release from his/her College.

Program Manager (40% FTE). His/her functions will include the coordination of programs, budget and personnel management, membership updates, and keep track of activities and deliverables. In addition, the PM will be in charge of seminar organization and administration of the Executive Director's activities (managing calendars, phone calls, meetings, etc).

IT support person (20% FTE). In addition to access to the Hunter College ICIT services, CoSSMO may have special needs to support the electronic equipment and provide help to the various users.
Resident Scholars in Emerging Technologies. What makes CoSSMO a special and ambitious initiative is the ORE principle, which integrates the knowledge of mathematical and computing methodologies for problem solving and the expertise in specific areas of applications. It is this principle that will provide members of the academic community at CoSSMO the potential to contribute to society. The field known as “Operations Research” (OR) can be described in very similar terms, and there exist established computer algorithms to solve certain problems. Examples of areas of application are finance, public transportation, telecommunication networks and health management. Because different applications have their specific problem settings, it is necessary to understand how to apply cutting-edge methodologies beyond traditional OR to approach these problems. Industry and the public sector may be unaware or unwilling to test the efficacy of such new methods. CoSSMO will work to attract experts in various important emerging technologies that are expected to impact scientific research in the 21st Century, with the view to enhance the projected activities. Examples of such technologies are:

- Change detection techniques: these are sophisticated statistical algorithms for computers to process various data from automatic sensors and trigger “intelligent” decisions as to whether there is a change in regime that should be cause for alarms or serious adjustments. Applications of these techniques can have unprecedented success from computer vision, to anticipation of financial crises, to climate change.
- Data Analytics: massive processing of statistical data that allows computers to discover patterns and act “intelligently”. Most notably, the recent success of the IBM Watson algorithms exemplifies the power that such methodologies will acquire in our immediate future.
- Evolutionary optimization algorithms: techniques for optimization of large complex systems have recently been proposed that mimic the manner in which genetic mutations succeed in natural selection, and others mimic the manner in which animal colonies (notably ants and bees) communicate simple individual directives in order to produce a coherent behavior that results in intelligent actions with purpose that goes beyond what each individual can grasp.

Resident Scholars in Emerging Technologies will be hired either:

- As regular Research Fellowships funded by research grants or private sources,
- Visitors on Sabbatical from their institutions (national and international) whose stay will be funded by seeking special collaborative grants or who bring their own funding,
- Invited CUNY professors on teaching release from their college, upon approval of the appointment by the Provost of the CUNY College where the affiliation of the Professor is.

The Resident Scholars in Emerging Technologies will be expected to work at CoSSMO on a Full time basis conducting their research and teaching duties (if any). Their teaching should support the development of pedagogical material and courses using and illustrating their area of expertise (emerging methodology). They should liaise with the current student members and actively seek research opportunities, participating in joint grant applications with the members of CoSSMO. It is also expected that the Resident Scholars will bring visibility by engaging in contracts with the private and public sectors of society, and be involved in creating internships and/or professional outreach educational programs that will help to bring funds to CoSSMO. It is desirable that the resident Scholars contribute to the creation and support of undergraduate and graduate material in the area of Statistics, Computer Simulation and Operations Research.

5. OPERATIONAL STRUCTURE

Core Staff for Institute:
Executive Director, Deputy Director, the three Leads, the Program Manager, and the IT staff.

Advisory Board:
Heads (or delegates) of target Departments across CUNY will automatically be invited to the board. Selected distinguished members from public and private sectors of the community will also be invited as “Scientific Expert Leads” (SEL). Annual meetings will be coordinated with the annual workshops. Initially, we have invited Robert Paaswel (CUNY), Jane Snowdon (IBM), Michael Fu (Maryland), Sigrún Andradóttir (Georgia Tech), Harold J. Kushner (Brown, retired), and Franklin Steen (Touro College).
**Operational Review Committee:**
Executive and Deputy Directors, the three Leads, one to three other members from the Advisory Board, one external academic member, one external member from an interest area (public health, finance, transportation, telecommunications, energy sector, etc), the Resident Scholars and the PM. This committee will be formed ad-hoc and membership will be periodically reassigned as necessary.

**Affiliated Members:**
Professors, external collaborators and students with active projects in CoSSMO's portfolio.

**Ad-hoc members:**
Approved by consensus of the Core Staff on a case-by-case basis.

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**Weekly seminars and monthly colloquium/workshop:** informal seminars where different projects are discussed (mainly, student presentations). To promote participation of Affiliate members (academic), the bi-monthly colloquium will seek to attract the majority of interested members across CUNY, who would not otherwise have opportunities to meet. The colloquium will present current and proposed projects, latest findings, and lectures from invited speakers. This series will also serve to attract good PhD students and will promote cross-fertilization of ideas. An annual workshop will be organized to attract academic and non-academic members and discuss current research topics as well as new proposals.

**Periodic meetings of Operational Review Committee:** these meetings will present updates and new developments in research, areas of applications and teaching. This will be the most important mechanism for networking and sharing information.
6. DELIVERABLES

Our computer lab is located at Room 1000 C at Hunter North. It will provide a physical space and the infrastructure for the student members working on various projects. Academic members affiliated with the Institute will find space and opportunities for interaction. Affiliated Members will have access to the three research dimensions through the three Leads of the Institute.

The deliverables of the Leads will be to facilitate super-linear growth of academic output (publications), research contracts, teaching material and grants. Specifically, affiliated members will have the opportunity to obtain additional funding by industry from the interactions provided by the Institute’s inter-departmental activities and industrial links. It will also promote more research projects and research questions by applying similar methodologies in diverse disciplines of the private and public sectors. Finally, it will increase the value by sharing teaching materials across the curriculum and facilitating the enrichment of inter-departmental curriculum through specialized concentrations.

Example: From a project on the valuation of financial options by simulation supervised by Prof A (Mathematics, Brooklyn), who has an interaction with Financial Institution B, a new algorithm based on statistical techniques is used. A simplified problem can be used for illustrating the methodology in an existing course (say, STAT 319: Bayesian Statistical Inference in the Sciences). This is a course that is offered in Hunter’s Quantitative Biology program. Our Lead for Education proposes that Hunter develops an on-line interdepartmental program; say in Computational Finance, with Computer Science (Graduate Center and Queens), Mathematics and Statistics (Hunter and Brooklyn), Economics (Hunter), and Business School (Baruch). He/she can help to promote cross-fertilization by providing teaching material to add to STAT 319, and then incorporate STAT 319 to the curriculum of the new program in Computational Finance.

Example: A project in telecommunications supervised by Prof A (Engineering, City College) and Prof B (Computer Science, Hunter) uses stochastic optimization methods in his research for a network routing problem. During the Operational Review, the Head of Geography realizes that these methods may be implemented for adaptive routing design in a GPS project undertaken by Prof C (Geography, Hunter) that will incorporate satellite information to adjust for current traffic conditions. A new project is thus begun, possibly leading to a research grant or a contract, by studying the appropriate modifications of the existing routing algorithms for the telecom project. Further, the techniques and methodology are identified by the Institute of Urban Sustainability to be relevant to traffic modeling and control of urban transportation networks. Shared knowledge on various projects includes mathematical theorems, advanced simulation methodology and software engineering. Some projects may be achieved with fewer students working on the mathematical principles that apply to all real-life situations. The knowledge base and precedent work at the Institute will provide a stronger proposal to obtain a grant for new applications.

Example: A project to model contagious disease control uses a statistical analysis for stochastic networks and a simple model can be used as a case study for STAT 702: Advanced Probability Theory II at Hunter College, and also for other courses. Teaching material with an important application component will be made available to Professors in CUNY through a database of case studies and exercises. This material will be ready for incorporation to the courses with minimal extra effort from lecturers, with the added value of extra materials with examples that support their topics with realistic contents, so that students may enrich the learning experience.

Example: Prof A has just missed the deadline for, or was denied a Government research grant. However his/her project is mature and can be submitted to our Institute, for which a standing scholarship from Industry can be facilitated by our network via any of the three dimensions and across the member Departments. Because the core will judge the value to the Departments of the College, the fact that it was denied by an outside source of funding does not mean that their research proposal will not have academic merit for CUNY. An alternative is that the Advisory Board may see an increased value of this proposal by applying the research ideas in a different dimension or in a different area (Department or sector).
7. THE LAB

The CoSSMO Lab is located in Room 1000 C at Hunter North, a newly created space encompassing 924 ft\(^2\). The creation of the lab facilities was part of a larger renovation project for which Hunter College contributed $350,000 and CUNY contributed $100,000. The state of the art mobile computing equipment will provide unique opportunities for creative problem solving. Emerging technologies that were not yet as ubiquitous even three years ago include a variety of mobile devices and sensors that are readily available today. Understanding, re-programming, and experimenting with these devices will be an integral part of many projects. Besides the use of mobile devices in research, the development of modern educational modules will rely on the creation of websites, dynamic applications and mobile apps, catering for multiple media. CoSSMO will operate in conjunction with Hunter College Library, who will keep and manage the loans of our mobile devices and laptops to members of CoSSMO.

The design of the lab is modern and practical, providing flexible sitting space for visitors as well as permanent workstations for long term residents (mainly PhD students). Created as an open plan office, it has an area for informal discussions and meetings, and three desks are set apart for Academic Visiting Faculty (international collaborators, Resident Scholars, etc).

Preliminary layout of the CoSSMO Lab:
8. FINANCIAL PLAN

Direct Research Costs: initial operation

To August 2012, Prof Saad Mneimneh (Hunter) and Prof Olympia Hadjiliadis (Brooklyn) have accepted our invitation to become the first members of CoSSMO. Our initial research portfolio comprises projects supervised that are under way:

<table>
<thead>
<tr>
<th>Source</th>
<th>PI</th>
<th>Title</th>
<th>Projects</th>
<th>Funding</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYSERDA</td>
<td>Felisa, Saad, Brown, Gong and Daus Mneimneh and Felisa</td>
<td>CommuniCars: intelligent collective transportation</td>
<td>2 G, 4UG students, and 1 RA</td>
<td>$266,820</td>
<td>2013-2015</td>
</tr>
<tr>
<td>NSF-EAGR</td>
<td>Mneimneh and Felisa</td>
<td>Probabilistic methods for Bioinformatics</td>
<td>2 PhD students</td>
<td>$200,000</td>
<td>2011-2013</td>
</tr>
<tr>
<td>PSC-CUNY</td>
<td>Felisa</td>
<td>Intelligent Algorithms for Decision Making</td>
<td>3 UG students</td>
<td>$6,000</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Shuster</td>
<td>Felisa</td>
<td>Emergency department patient flow optimization</td>
<td>2 (G or UG) students</td>
<td>$2,500</td>
<td>2012</td>
</tr>
<tr>
<td>RF/tax levy</td>
<td>Felisa</td>
<td>Start-up grant</td>
<td>Various</td>
<td>$90,000</td>
<td>2009--</td>
</tr>
<tr>
<td>GRTI-16</td>
<td>Felisa</td>
<td>Equipment</td>
<td>CoSSMO Lab</td>
<td>$46,000</td>
<td>2013</td>
</tr>
</tbody>
</table>

Direct Research Costs: business plan

Many of the activities of the Institute fall under umbrella of the fields of Operations Research and Computer Science. The main emphasis of the Institute is on using mathematics and algorithms to solve problems of interest to an industry or more particularly a particular company. Even when the statement of the problem is specific to a single company, the abstraction and solutions will have a broader application than to the Industry and even to more than one industry. Thus grants and funding will be explored from government and industry (see Appendix 3 for details).

We will also pursue educational grants for the creation of new courses and materials, and seek financial support from companies and government agencies in the New York area (MTA, Google, banking institutions, pharmaceutical companies, Verizon, Apple and IBM, Gates foundation, etc). The role of the Institute will be to help identify funding opportunities and manage the research portfolio to maximize cross-fertilization. We will focus on value added and efficient use of funding.

The following international research groups have already expressed interest in joint application for funding to pursue research within CoSSMO:

- GERAD (groupe d'études et de recherches en analyse de décision), Montreal.
- MORE, operations research consulting center at the University of Melbourne.
- CSIRO, the Australian Commonwealth scientific and research organization.
- Center for Actuarial Studies, Department of Economics, the University of Melbourne.
- Researchers in the Economics Department and in the Mathematics Department at the Vrije Universiteit, Amsterdam.
- Researchers in the Department of Statistics and Decision Support Systems and in the Department of Mathematics, University of Vienna.
- Instituto de Empresa (IE) Business School, Madrid.
- Universidad Autónoma de México (UAM-Iztapalapa), Mexico.
**Computer Lab: equipment.**

The following is a possible plan for furnishing the equipment in stages:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell File server, multi-core machine</td>
<td>$5,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data storage array</td>
<td>$10,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printer, fax, copier, scanner HP</td>
<td>$5,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portable projector</td>
<td></td>
<td></td>
<td>$1,000.00</td>
</tr>
<tr>
<td>Miscellaneous software</td>
<td>$500.00</td>
<td>$1,000.00</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>Wireless router</td>
<td>$200.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplies</td>
<td>$2,000.00</td>
<td>$2,000.00</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>i-Mac computers @ $2000</td>
<td>$4,000.00</td>
<td>$4,000.00</td>
<td></td>
</tr>
<tr>
<td>Laptops @ $1800</td>
<td>$7,200.00</td>
<td>$3,600.00</td>
<td>$3,600.00</td>
</tr>
<tr>
<td>Keyboard and mouse @ $100</td>
<td></td>
<td>$300.00</td>
<td></td>
</tr>
<tr>
<td>24” Dell screen @ $300</td>
<td></td>
<td>$900.00</td>
<td></td>
</tr>
<tr>
<td>Tablets @ $500</td>
<td></td>
<td></td>
<td>$3,000.00</td>
</tr>
<tr>
<td>Programmable sensor network Xbox @ $1,400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other mobile devices</td>
<td></td>
<td></td>
<td>$6,000.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$23,300.00</td>
<td>$22,800.00</td>
<td>$17,600.00</td>
</tr>
</tbody>
</table>

The lab will require network setup and initial software installation through CUNY licenses (Mathematica, Matlab, Microsoft Office, SPSS, SAS, etc). Email service will also be provided by ICIT at Hunter College. Initial funding has been secured through the GRTI-16 round.

Computer equipment and facilities will need to be upgraded on a regular basis. For this, we project the need for **$70,000** every four years of operation.

**Operational Costs: Personnel and meetings**

- Summer salary and teaching release for Executive Director: $40,000
- Teaching release or equivalent for three Leads: $24,000
- Research expenses for Leads: $3,000
- Part time IT support: $14,400
- Part time program manager: $20,800 - $31,000 (*)
- Monthly colloquium series: $5,500
- Annual workshop/advisory board meeting: $20,000

**TOTAL OPERATIONAL COSTS**

**$120,500 - $130,700**

(*) Non-teaching adjunct at $50/hr, 625 hours per year (2 days a week for 40 weeks), or Graduate student aid at $20/hr, 1040 hours per year (3 days per week for 44 weeks) $20,800.

**Operational Costs: business plan**

In the first three to five years of operation we will seek contributions from donors to hopefully build an endowment for CoSSMO. Independently, we have a business plan for the long-term self-financing operation as follows.

Because the focus on the Institute is not financial, the primary source of income will naturally be from the overhead of the research grants. Because the Lab and equipment is located and maintained at Hunter College, the Institute recognizes that research projects will use resources that incur costs to Hunter College. Many of these expenses cannot be covered with regular research funds, such as salary for the PM and IT personnel, maintenance of the facilities, etc. Therefore, in consultation with the Provost of Hunter College, we propose a breakdown of the overhead of grants that support projects in CoSSMO’s portfolio as follows:
The mission at CoSSMO focuses on academic development and on the promotion of interdisciplinary activities across CUNY. It is not intended to create monetary benefit. However, we believe that the areas of optimization and computer simulation are important and we will endeavor to attract contracts, research grants and hopefully donations. The goal is to attain self-financing in the near future.

<table>
<thead>
<tr>
<th>Overhead from Research Grants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CoSSMO</td>
<td>42.5%</td>
</tr>
<tr>
<td>Hunter College</td>
<td>22.5%</td>
</tr>
<tr>
<td>PI's Institution in CUNY</td>
<td>35.0%</td>
</tr>
</tbody>
</table>

The expected source of funding and expected income are as follows:

<table>
<thead>
<tr>
<th>Expected Source of Funding</th>
<th>Expected income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead from expected research grants (at $500,000 per annum)</td>
<td>$100,000/year</td>
</tr>
<tr>
<td>Contracts with industry and public sector</td>
<td>$20,000/year</td>
</tr>
<tr>
<td>Continuing education and training in the city (outreach programs)</td>
<td>$15,000/year</td>
</tr>
<tr>
<td>NSF and industry grants to fund workshops</td>
<td>$20,000/year</td>
</tr>
<tr>
<td>Equipment Grants from government</td>
<td>$70,000 (every 4 years)</td>
</tr>
</tbody>
</table>

This plan assumes that we can ensure about 5 regular NSF grants active every year, which is a reasonable expectation if CoSSMO can attract at least 10 active researchers across CUNY, or if we can secure a large NSF research grant. The business plan is detailed in Appendix 4.
APPENDIX 1: Timeline for activities in first year

If this proposal for the CoSSMO Institute is endorsed by CUNY in the Spring semester 2013, we envision a timeline for activities for the first year, as depicted in the slide attached.

First Board Meeting. This initial meeting will be organized to allow a short presentation by the members representing various target Departments at CUNY, explaining broadly what areas in their Departments may need to use mathematical methods for optimization and control. The outcome of this first meeting will be the identification of individual Faculty members who may have a potential project for the Institute.

First Annual Summit. In the summit all the identified Faculty members will be asked to present aspects of their research that use or need stochastic modeling and optimization (Fall 2013). An international keynote speaker will set the pace with intriguing and open questions to motivate the work of the Institute. We have identified three possible speakers: Dr Ari Fainchtein (who visited us in May 2011), who proposes to create an integrated model for a sustainable farm and nutritional system in Australia, Dr René Aid from Electricité de France, who actively seeks collaborations with research institutes to understand the dynamics of pricing and strategic supply management in the electricity sector, and Prof Daniel Dufresne, Director of the Center for Actuarial Studies at the University of Melbourne, who works in mathematical finance and applied probability. A workshop follows the presentations, where different participants will be grouped according to their common interests. The outcome of this workshop will be in the form of concrete proposals for projects specifying who is involved and from which Departments, which sector in society is targeted for the project, and whether it is a short Summer project or a longer one, and at which level for the students. Projects may involve various students at various levels, for example a first year student in Biology may work with a third year student in Mathematics and Statistics to produce a mathematical model to analyze genetic data.

A week after the summit we will produce a website advertising all the research projects that will be offered and those already on-going. The monthly colloquium and workshop series can run in the Fall 2013.

Weekly seminars will run from the start with the students that are already working at the lab. The first projects of the Institute will include on-going research programs:

- Probabilistic methods in bioinformatics, with Prof Saad Menimneh (Hunter College) and GC students Alaxey Nikolaev and Sayed Ali Ahmed.
- Understanding cycles in commodity pricing, with Prof Daniel Dufresne (University of Melbourne) and BHP Billiton.
- Model for energy storage and release, joint collaborations with the Stochastic Optimization Working Group (SOWG) and EDF (France), studying hydroelectric production, and with A/Prof Owen Jones and the CSIRO (Australia) studying windmill optimal battery management. Former Macaulay Honors student Pinhus Dashevsky.
- Sustainable transportation systems: flexible buses and public bikes for NYC, also in collaboration with Frédéric Meunier (SOGW) in France. Collaborating with Ron Spalter and Neil Richardson (CUNY). Hunter College student Nick Crister, GC students Brian Phelan, Ivan Dryanovsky, and Agis Mesolongitis and Hunter College lecturer Eric Schweitzer.
- Optimization of Emergency Departments: a network queueing model, interactive simulator prepared by GC student Eric Osicek and Hunter College student Rehana Rassul (Shuster grant).
- Self-optimized farming for sustainability: project with colleague Ari Fainchtein (Australia). Collaboration with the CUNY Institute for Sustainable Cities.
- Public transport on demand: in collaboration with Ted Brown (GC), Saad Menimneh (Hunter), Matt Daus (City College), Hongmian Gong (Hunter) and research assistant Ben Schaeffer. This project is an extension of the work with colleagues Guy Cohen and Jennie Lioris (ENPC, France).
**GOALS**

- Establish Initial Membership
- Establish Project Portfolio
- Engage First Students
- Identify Initial Synergies
- Conduct first Annual Summit

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**Initial Proposed Affiliated Members**

- **Hunter:** S. Mneimneh, A. Frei, P. Marcatulio, B. Solecki, S. Shankar, S. Clark, J. Loustau, P. Deb, D. Sylvan, R. Thompson...
- **Brooklyn:** A. Bar-Noy, P. Whitlock
- **Queens:** A. Rosenberg
- **Baruch:** W. Millhiser, R. Blau, E. Rogoff, E. Gottlieb, A. Harel
- **City College:** M. Daus, C. Vörösmarty, R. Kaliappa
- **City Tech CC:** D. Kahrabaei
- **FRANCE:** G. Cohen, P. Carpentier, L. Andrieu, M. de Lara
- **AUSTRALIA:** D. Dufresne, O. Jones
- **CANADA:** GERAD, V. Krishnamurthy, P. Marcotte
- **NETHERLANDS:** B. Heiddegott
- **AUSTRIA:** G. Pflug, S. Wegenkittl

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<th>Spring 2013</th>
<th>Summer 2013</th>
<th>Fall 2013</th>
<th>Winter 2014</th>
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<td>1. Finalize and agree on the Proposal</td>
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<td>2. Identify Members and Board mtg</td>
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<td>3. Official Launch of CoSSMO</td>
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<td>4. Industry and int'l association</td>
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<td>5. Faculty association</td>
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<td>6. Bring first visitors for Summit</td>
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<td>7. First Annual Summit</td>
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<td>9. Weekly Seminars</td>
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<td>10. Colloquium Series</td>
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APPENDIX 2: List of potential CUNY members identified initially (besides Felisa and Ted):

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<td>Shulamith Gross</td>
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<tr>
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<tr>
<td>Hunter</td>
<td>Purvi Sevak</td>
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<td>Hunter</td>
<td>Howard Chernick</td>
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<td>Hunter</td>
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<td>William Solecki</td>
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<td>Hunter</td>
<td>Roger S. Pinkham</td>
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<td>Mattia Gilmartin</td>
<td>Nursing</td>
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<td>Steven Greenbaum</td>
<td>Physics &amp; Astronomy</td>
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<td>Y.C. Chen</td>
<td>Physics &amp; Astronomy</td>
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<td>Hunter</td>
<td>Noel Goddard</td>
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<td>Queens</td>
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<tr>
<td>Staten Island</td>
<td>Tobias Schäffer</td>
<td>Mathematics</td>
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</table>
APPENDIX 3: Specific funding opportunities.

GRANTS FROM GOVERNMENT

New York State: New York State has two agencies that can provide funds for the Institute.

- NYSTAR, the New York State Technology and Research Agency funds several programs that will be useful for the Institute. One is for matching grants. These grants leverage resources from federal or private sources, including the National Science Foundation, the National Institutes of Health, businesses, industry consortia, foundations, and other organizations. Another is for a center of excellence. At the moment there is no call for one, but CoSSMO is ready when one appears. CISDD the sister organization of CoSSMO has gotten funds from NYSTAR in the past.

- NYSERDA, the New York State Energy Research and Development Authority funds energy-related projects, transportation projects, etc. We will explore grants using NYSERDA funding when the project lends itself to it. Examples of funding opportunities include education, the grid, and smart buildings.

Federal Government: NSF has a number of programs that are appropriate. We start this section with a document that delineates their longer range funding plans.


“The recent task force report of the Advisory Committee on Cyberinfrastructure identifies several key challenges in software covering compute-intensive science, data, software evolution, and institutional barriers to software. Key recommendations from the task force include providing long term, comprehensive support for software at different levels; addressing verification, validation, uncertainty quantification, sustainability and reproducibility; providing policies for open source software; coordinating software activities across NSF, with other federal agencies, and with industry; and mechanisms for community input on software priorities. Improving education at all levels and training across disciplines in software use and development is also a recognized challenge.”

The bullet points made in the document that are relevant here are:

- **Research**: Support the foundational research necessary to continue to efficiently advance scientific software, responding to new technological, algorithmic, and scientific advances.
- **Science**: Enable transformative, interdisciplinary, collaborative, science and engineering research and education through the use of advanced software and services.
- **Education**: Empower the current and future diverse workforce of scientists and engineers equipped with essential skills to use and develop software. Further, ensure that the software and services are effectively used in both the research and education process realizing new opportunities for teaching and outreach.”

NSF grants tend to be very competitive within computer science. We may need to submit twice to win. Below are four; there are other NSF grants that can be appropriate.

I. Catalyzing New International Collaborations (due anytime): We intend to submit to this one to increase our already strong ties with researchers outside the U.S.

“This solicitation can support U.S. participation in a variety of different types of activities intended to catalyze new international collaborations. These include, but are not limited to: planning visits, small workshops, initial data gathering activities, and the development of research coordination networks. The community is invited to propose innovative mechanisms and strategies for catalyzing new international collaborations to the stage that competitive research and education proposals can be submitted to relevant
NSF programs for on-going support of the project. Any well-justified activity that fulfills the goals of the program will be considered. Creative use of technology in promoting international collaboration is encouraged. Funding levels for catalytic activities can typically range from as little as $10,000 to as much as $100,000, depending on the activities proposed.”

II. Research Collaboration Networks: Together with our established collaborators abroad, we plan to apply for the general topic (due anytime) “The goal of the RCN program is to advance a field or create new directions in research or education. Groups of investigators will be supported to communicate and coordinate their research, training and educational activities across disciplinary, organizational, geographic and international boundaries. RCN provides opportunities to foster new collaborations, including international partnerships, and address interdisciplinary topics. Innovative ideas for implementing novel networking strategies, collaborative technologies, and development of community standards for data and meta-data are especially encouraged.” Jointly with the CISC we plan to apply for the RCN-SEES track (due February 2013): “The Science, Engineering and Education for Sustainability track focuses on interdisciplinary topics that will advance sustainability science, engineering and education as an integrative approach to the challenges of adapting to environmental, social and cultural changes associated with growth and development of human populations, and attaining a sustainable energy future.”

III. Grant Opportunities for Academic Liaison with Industry (GOALI) (due anytime): Grant Opportunities for Academic Liaison with Industry (GOALI) promotes university-industry partnerships by making project funds or fellowships/traineeships available to support an eclectic mix of industry-university linkages. Special interest is focused on affording the opportunity for:

- Faculty, postdoctoral fellows, and students to conduct research and gain experience in an industrial setting;
- Industrial scientists and engineers to bring industry's perspective and integrative skills to academe; and
- Interdisciplinary university-industry teams to conduct research projects.

IV. Industry/University Cooperative Research Centers Program (I/UCRC) We will first write a proposal for a planning grant. The Industry/University Cooperative Research Centers (I/UCRC) program develops long-term partnerships among industry, academe, and government. The centers are catalyzed by a small investment from the National Science Foundation (NSF) and are primarily supported by industry center members, with NSF taking a supporting role in the development and evolution of the center. Each center is established to conduct research that is of interest to both the industry members and the center faculty. An I/UCRC contributes to the Nation's research infrastructure base and enhances the intellectual capacity of the engineering and science workforce through the integration of research and education. As appropriate, an I/UCRC uses international collaborations to advance these goals within the global context.

An I/UCRC has the following infrastructure:

- Industrial Support Requirements:
  - Members are comprised of industrial firms, organizations, and non-NSF Federal agencies;
  - Members can be:
    - Full members - with full membership rights who support the center.
    - Associate members - memberships with reduced rights commensurate with their support for the center (often a firm with fewer than 500 employees).
  - fees totaling $325,000.
• A single university center must have a minimum of $400,000 annually in membership fees with a minimum of eight full members.

Planning Grant for establishing a new center - $11,500 per academic institution for a planning grant award with a 12-month duration. The $11,500 is for all expenses including travel to the "bootcamp." In addition, the lead institution for a new center’s planning grant meeting will receive $3,000 which is to be paid directly to an evaluator. The evaluator will guide the directors in Phase I - First Five Year Center Award

Multi-institutional center proposals are given preference over single institutional proposals. The initial I/UCRC award to a center has a potential duration of five years. NSF support is intended to augment the support that a center receives from industry and other sponsors. The I/UCRC program uses the following funding formulas. Multi-institutional research sites with an annual industry membership participation between $150,000 to $300,000 can receive up to $55,000 annually. (Note - the center must obtain a total of $300,000 in membership participation to receive an award.) Multi-university research sites with $300,000 or more in annual memberships can receive up to $80,000 annually. Single university I/UCRCs obtaining $400,000 or more in annual memberships can receive up to $80,000 annually.

GRANTS FROM INDUSTRY

There are two types of grants from industry, broad grants and specific grants

**Broad grants:** Some companies provide grants for broad accomplishments such as training, or for specific or general purpose. These are often from their foundations. Examples are Bloomberg, Inc, Verizon.

**Specific grants:** We will be expecting grants of a small size (~$25,000) from companies that expect us to provide a service as a consultant. They do this to attract students while solving a problem that they are interested in solving and do not have the expertise.

**Special Opportunities:** The INFORMS (Institute for Operations Research and Management Sciences) is now offering funding opportunities for new initiatives that promote their mission statements. Our vision and the ORE principle are in alignment with this institution, and we plan to apply for an INFORMS new initiative in 2012 to secure funding to support the operation of an INFORMS program within our Institute. These grants are expected to be in the amount of $30,000.00 per year.
### BUDGET SUMMARY

**OPERATING**

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**LAB OPERATING SUPPORT**

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**EXPENSE**

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**NET/DEFICIT**

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Felisa J. Vázquez-Abad

Education

Brown University, U.S.A.  
Applied Mathematics  
Ph.D., 1989

Universidad Nacional Autónoma de México (UNAM)  
Statistics and Operations Research  
M.Sc. with honors, 1984

UNAM  
Physics  
B.Sc., 1983

Felisa’s research lies at the intersection between mathematics, engineering and computer science. She is mainly interested in the optimization of complex systems under uncertainty, primarily to understand, control and/or build efficient self-regulated learning systems. She has applied novel techniques for simulation and optimization in telecommunications, transportation, finance and insurance and she is interested by real life problems. As a student, she was recipient of a number of scholarships, including a NASA scholarship in 1987-88. In 1993-94 she was the recipient of the Young researcher Award (FCAR) and of the Women in Faculty Award (NSERC) in Montreal, Canada. In 2000, she was a recipient of the Jacob Wolfowitz award for advances in the mathematical and management sciences.

Academic Positions

- 02/11 – today Principal Research Fellow (honorary), Dept. of Economics, University of Melbourne.
- 09/09 –today Full Professor, Dept. of Computer Science, Hunter College of the City University New York.
- 03/09 – 05/09 Principal Research Fellow, Dept. of Economics, University of Melbourne.
- 08/04-02/09 Associate Professor, Dept. of Mathematics and Statistics, University of Melbourne.
- 10/01-06/02 Principal Research Fellow, Dept. of Electrical and Electronic Engineering, University of Melbourne. (On leave from Montreal).
- 10/98-12/99 Research Fellow, Dept. of Electrical and Electronic Engineering, University of Melbourne, Australia. (On Sabbatical).
- 06/93-09/05 Professor (Assistant ’93, Associate ’96 and Full ’04), Département d’informatique et recherche opérationnelle, Université de Montréal.
- 03/93 - 06/93 Visiting Researcher, Département d’informatique et recherche opérationnelle, Université de Montréal.
- 12/91 - 12/92 Research Associate, INRS-Télécommunications, Université du Québec.
- 06/90 - 11/91 Postdoctoral Student, INRS-Télécommunications, Université du Québec.
- 07/89 - 05/90 Visiting Assistant Professor, Division of Applied Mathematics, Brown University.
- 06/89 - 07/89 Visiting Research Associate, Division of Applied Mathematics, Brown University.
- 07/86 - 06/87 Research Assistant, Division of Applied Mathematics, Brown University.
- 04/83 - 01/85 Research Assistant, Dept. of Physics, UNAM.

Teaching


Research Supervision

- Thesis Supervision: 11 Masters and Doctoral, 4 Honours.
- Summer research: 14 Undergraduate student projects.
- Research assistantships and internships: 12 undergraduate and graduate student projects.
Research Grants (past 10 years only)

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Project</th>
<th>Per Year</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSC-CUNY 43</td>
<td>Intelligent algorithms for decision making under probability constraints</td>
<td>$6,000</td>
<td>2012-2013</td>
</tr>
<tr>
<td>Shuster Hunter College</td>
<td>A simulation model for the optimization of patient flow in an emergency department</td>
<td>$2,500</td>
<td>2011-2012</td>
</tr>
<tr>
<td>GRTI 14</td>
<td>Computer Lab Equipment</td>
<td>$24,000</td>
<td>2010-2011</td>
</tr>
<tr>
<td>PSC-CUNY 41</td>
<td>Understanding Risk Evaluation for Decision Making</td>
<td>$2,860</td>
<td>2010-2011</td>
</tr>
<tr>
<td>CUNY</td>
<td>Start Up Funds</td>
<td>$40,000</td>
<td>2009-2012</td>
</tr>
<tr>
<td>BHP Billiton</td>
<td>PhD Student scholarship (top-up)</td>
<td>$30,000</td>
<td>2006-2012</td>
</tr>
<tr>
<td>NSERC Individual</td>
<td>Simulation and Optimisation of Complex Stochastic Discrete Event Systems (DES)</td>
<td>$25,000</td>
<td>2004-2005</td>
</tr>
<tr>
<td>NSERC Individual</td>
<td>Simulation and Optimisation of Complex Stochastic Discrete Event Systems (DES)</td>
<td>$24,450</td>
<td>2000-2004</td>
</tr>
</tbody>
</table>

Collaborative Projects

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Project</th>
<th>Per Year</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCWIT</td>
<td>Adapting Emerging Scholars Program (Hunter College) V. Teller, S. Epstein and FJ Vázquez-Abad</td>
<td>$5,000</td>
<td>2011-2013</td>
</tr>
<tr>
<td>NSF EAGER</td>
<td>Combinatorial and Probabilistic Aspects of Biological Problems S. Mneimneh and FJ Vázquez-Abad</td>
<td>$100,000</td>
<td>2010-2012</td>
</tr>
<tr>
<td>ARC Linkage Grant BHP Billiton</td>
<td>Understanding cycles in mineral commodity price, a market model with uncertainty, Vázquez-Abad D. Dufresne (Melbourne), M. Menabde (BHP Billiton)</td>
<td>$180,605</td>
<td>2009-2012</td>
</tr>
<tr>
<td>FAST ISL</td>
<td>Objective risk evaluation and decision making under uncertainty FJ Vázquez-Abad and O. Jones</td>
<td>$40,000</td>
<td>2008-2011</td>
</tr>
<tr>
<td>MORE Contract</td>
<td>Bus fleet optimization for the Melbourne Airport Car Park FJ Vázquez-Abad, Munish Goyal.</td>
<td>$10,000</td>
<td>2005</td>
</tr>
<tr>
<td>NSERC Strategic</td>
<td>Synthesis of agile photonic networks with stochastic demands B. Sansò, A. Girard, FJ Vázquez-Abad</td>
<td>$150,000</td>
<td>2002-2005</td>
</tr>
<tr>
<td>FCAR Teams (renewal)</td>
<td>Simulation of Stochastic Models, FJ Vázquez-Abad, P. L’Ecuyer</td>
<td>$56,000</td>
<td>2003-2005</td>
</tr>
</tbody>
</table>

Administrative Duties and Service to the Discipline

- 2009 – 2012: Initiative for the establishment of the CUNY Institute for Computer Simulation, Stochastic Modeling and Optimization (CoSSMO). The vision is to integrate Outreach, Research and Education (the “ORE” principle) with interdisciplinary student projects of relevance for the society and for the advancement of knowledge. CoSSMO will help students understand specific public and private sector needs, and will also provide training to specialists outside the university.

- 2010-2013: Senator for Computer Science at Hunter College. Member of committees on the Master Plan committee and on Graduate Course and Academic requirements.

- 2010: Member of the Program Development Committee for the new Information Systems masters degree in Urban Sustainability, Graduate Center, CUNY.

- 2010 Member of the proposal review panel for Operations Research, NSF.

- 2009 – 2010: Member of the Hiring Committee for Professorial position, Computer Science Department, Graduate Center of CUNY.

- 2007: Selection Procedures Committee, University of Melbourne.

- 2007: Colloquium Organisation, Department of Mathematics and Statistics at the University of Melbourne.
• 2006: Academic Women in Leadership, University of Melbourne.

• 2005 – 2006: Chair of Honours Committee and co-ordinator for the Key Centre for Statistical Studies (KCSS), Department of Mathematics and Statistics at the University of Melbourne.

• 2004 – 2009 Participation in selection committees to appoint teaching and research staff Positions in the area of Statistics and Stochastic Processes, and in Continuous modelling. Member of PhD and Lecturer confirmation panels, Department of Mathematics and Statistics at the University of Melbourne.

• 2001 – 2002 Member of the Diversity Committee of the Faculty of Engineering in University of Melbourne.

• In October 2002 I represented the Department of Computer Science and Operations Research at the University of Montreal in the 2002 Innovation Forum of the adriq (association de la recherche industrielle du Québec).

• 1993 – 2004: Department of Computer Science and Operations Research at the University of Montreal. Undergraduate and Graduate student counselor, member of the Graduate admissions committee, member of the hiring committee, member of the teaching evaluation committee, and representative of the Department for the Masters programme in Mathematical and Computational Finance.

• 2001 – 2004: Member of the Selection Committee for the University Faculty Awards (NSERC), a Canadian Government programme to help minorities (women, aboriginal peoples, etc) to establish University careers.

Editorial


Associations


Synergistic Activites

• Outreach: Our US Patent No. 60/627,286 was developed in 2004 for an optical burst network switch. It is co-authored with a Hispanic colleague Prof Sansò, and M Sc student Gutiérrez-Cabrera. In 2005 I carried out a $10,000 subcontract to perform a study of the Melbourne Airport Car Park, with MORe (the University of Melbourne consulting center in Operations Research). For the period of 2008-2011 I established and succeeded funding for an international collaboration ($541,815 project) with BHP Billiton, the University of Melbourne and the University of Oregon, to study cycles in commodity prices.
• I have organized and secured funding for student international research trips: two female students from Montreal to Melbourne, and two from Melbourne to Montreal, between 2002 and 2003. I organized and secured the funding for my PhD (female) student to travel from Melbourne to Paris, and for two students and one (female) researcher in the electricity industry in France to visit Melbourne between 2008 and 2010. I also facilitated the visit of my Ph D (female) student from Melbourne to visit Hong Kong University in 2004 and the visit of one of my former M Sc (female) students from Montreal to visit the sugar technology plant in Spain to work on a joint optimization problem for production of sugar, in 2002. Throughout my career, I have actively encouraged students (particularly female and Hispanics) in Engineering and Computer Science to take advantage of opportunities to pursue and advance their scientific careers.

• From 2001 to 2004 I was elected member of the Selection Committee for the University Faculty Awards (NSERC), a Canadian Government programme to help minorities (women, aboriginal peoples, etc) to establish University careers. During my visit to University of Melbourne in 2001-2002 I was also a member of the Diversity Committee of the Faculty of Engineering in University of Melbourne. In 2006 I was awarded a place in the programme “Academic Women in Leadership” at the University of Melbourne, acknowledging my work and mentoring activities to promote participation of women in mathematics and engineering.

Publications and Communications

29 papers in refereed journals, 39 papers in refereed conference proceedings, 45 communications in international conferences without proceedings, 31 invited lectures from Academic institutions, 16 technical reports, and co-author/editor of 2 books. 1 US patent in optical network routing.

Refereed Journal Papers (past 10 years only)


Curriculum Vitae, Felisa J. Vázquez-Abad


**Referred Conferences Proceedings (past 10 years only)**

17. B. Heidergott, W. Volk-Makarewicz and F.J. Vázquez-Abad “Gradient estimation for quantiles of stationary waiting times”, *Proceedings of WODES'10*, Editors: Jörg Raisch and Alessandro Giua and Stéphane Lafortune and Thomas Moor, Berlin, Germany, IFAC, Aug 30 - Sep 1, 2010 : 251 - 256.


Theodore Brown

Current Address:
The Graduate School and University Center of CUNY
Computer Science Department
365 Fifth Ave., Room 4319
New York, New York 10016
(212) 817-8191
tbrown@gc.cuny.edu

EDUCATION:

New York University, New York
PhD awarded 1971 in Operations Research and Industrial Engineering

New York University, New York
Masters of Science 1968 in Operations Research

City College of New York, New York
Bachelor’s Degree awarded 1966 in Mechanical Engineering

EMPLOYMENT:

Executive Officer, CUNY Ph.D. Program in Computer Science, Graduate Center, City University of New York (2000 to present)

Executive Director, CUNY Institute for Software Design and Development, City University of New York (2000 to present)

Professor, Computer Science Department, Queens College, City University of New York (2000 to present)

Chairman of Computer Science, Computer Science Department, Queens College, CUNY (1988 – 2000)

Associate Professor, Computer Science Department, Queens College, CUNY (1981-1991)

Assistant Professor, Computer Science Department, Queens College, CUNY (1971-1981)

Adjunct Associate Professor, Einstein College of Medicine (1982-1989)

Consultant, Operations Research, Chemical Bank (1967-1971)

Graduate Assistant, Operations Research Department, New York University (1966-1967)

Mechanical Engineer, General Electric Company (1965-1966)

SELECTED PUBLICATIONS:
Mohammad Maifi Hasan Khan, Hossein Ahmadi, Gulustan Dogan, Kannan Govindan, Raghu K. Ganti, Theodore Brown, Jiawei Han, Prasant Mohapatra, Tarek F. Abdelzaher: DustDoctor: A self-healing sensor data collection system. IPSN 2011: 127-128


SERVICE: (selected)

Chair of the Computer and Information Sciences Section, The New York Academy of Sciences, 1998-2001
Chair, Computer Science Discipline Council, CUNY, 1998-
Board, New York Technology Council, 2009-
Executive Board, New York Industry Software Association, 2001 to 2007

PROFESSIONAL SOCIETIES:

Member, Informs
Association for Computer Machinery
IEEE Computer Society
February 8, 2013

To: The Trustees of The City University of New York

Re: Hunter’s Support for the proposed CUNY Institute for Computer Simulation, Stochastic Modeling and Optimization (CoSSMO)

From: Vita C. Rabinowitz
Provost and Vice President for Academic Affairs

Hunter College is proud to support and host the CUNY Institute for Computer Simulation, Stochastic Modeling, and Optimization (CoSSMO). Indeed, the conception of this interdisciplinary, forward-looking, practice-oriented Institute is not only consistent with our new strategic plan, but it embodies the very spirit of our vision to create student-centered, faculty-supported initiatives that prepare our students to thrive and lead in the 21st century. We recruited Computer Science Professor Felisa Vázquez-Abad to Hunter to create a vibrant quantitative laboratory that would engage our students with public and private entities that are immersed in solving pressing real-world problems. In CoSSMO, she has taken the lead in doing just that.

With its three-pronged approach to project development—outreach, research and education—CoSSMO will inspire and support productive collaborations among CUNY faculty, create teaching material and case studies that will be made available to the CUNY academic community. Further, it will increase and promote research output and knowledge transfer by identifying common features in mathematical models of current programs and potential new endeavors. It will stimulate communication, partnership and research among academic, government and business communities, all with the goals of advancing the methods of simulation and stochastic modeling to solve some of the great challenges of our time, triggering “intelligent” decision making in a changing world, discovering coherent patterns hidden in masses of data, and using resources efficiently and effectively.

With crucial support from CUNY, Hunter has constructed and equipped a dedicated laboratory for CoSSMO as an attractive and efficient student and faculty hub. The lab, almost complete as of this writing, will provide flexible seating space for researchers, and offers areas for informal meetings among faculty, students, visitors and staff. Hunter’s support for CoSSMO will be ongoing through reassigned time for Professor Vázquez-Abad and other Hunter faculty conducting research at the lab, as well as staff support and equipment maintenance.

Felisa’s vision, forged in collaboration with Ted Brown and others, has galvanized faculty throughout Hunter and CUNY. Indeed, letters of support from the CUNY Institute for Sustainable Cities, from Brooklyn and Queens Colleges of CUNY, from Brown University, IBM and from a prospective student attest to the wide and varied support the proposed Institute has received in both the academic and business communities.

The time is now for CoSSMo at CUNY. Again, we at Hunter are thrilled to be home to this innovative and auspicious entity, and I thank the trustees for their support.
To CUNY Board of Trustees
New York NY

Letter in support of the
Proposal for the CUNY Institute for Computer Simulation, Stochastic Modeling and Optimization
by Profs Felisa Vazquez-Abad and Theodore Brown

This is an impressive proposal and very timely. It is well thought out and very sound from the scientific, organizational, educational, and developmental points of view. The participants have excellent reputations and are very well qualified to carry out the project. As far as I know, there is nothing comparable in New York, which gives the project enormous opportunity. There are many businesses and municipal and academic departments that would greatly benefit from participation.

The proposal has broad and very worthy educational and scientific goals, and is an excellent method of bringing together and developing the faculty and departments of concern. The examples that are given of potential student research projects suggest the broad applicability and value of the proposed program. It is certainly a wonderful way to train students. The projects will yield material that will motivate and excite even the students who are not directly involved. I encourage you to support the proposal to the maximum possible extent. It is a unique opportunity and should be of great benefit to CUNY.

Harold Kushner
To: Vita C Rabinowitz, Provost at Hunter College  
From: James R. Stellar, Provost at Queens College  
Re: CoSSMO  
Date: January 14, 2013

I read with enthusiasm the proposal for a CUNY Institute for Computer Stimulation, Stochastic Modeling and Optimization.

The institute will plan and make strategic decisions and produce research. Its organization structure is designed to balance pure research with applied problem solving. The institute will collaborate with other CUNY institutes such as Sustainable Cities and Software Design and Development. By its three core principles of outreach, research and education, it will foster interactions with students, forge links among faculty from a variety of disciplines and benefit not only CUNY, but the wider arena of government and industry.

Queens College’s Professor Ted Brown has partnered with Hunter’s Professor Vázquez-Abad in the development of this proposal and I am happy to provide one course release so that Professor Brown can participate in the institute.
Dear Board Members:

This letter is to express IBM Research’s enthusiastic support for the CUNY Institute for Computer Simulation, Stochastic Modeling and Optimization (CoSSMO) proposed by the co-Principal Investigators Professors Vazquez-Abad and Brown.

IBM Research is familiar with the research and credentials of Professor Felisa Vazquez-Abad and Professor Ted Brown, with whom we have a history of collaboration via these IBM Research connections:
- Anand Ranganathan, existing transportation research initiative
- Chai Wah Wu, regarding future and strategic transportation research discussions
- Jane Snowdon
  - establishment of the CUNY, NYU, and IBM collaborative partnership for Smarter City research projects
  - contributor and Advisory Committee member in the design of the new MS in Information Technology and Urban Sustainability
  - member of the Advisory Board of the CISSD (CUNY Institute of Software Design and Development)

It turns out that, within IBM Research, our Business Analytics and Mathematical Science Strategy is well aligned in skills and interests with the academic disciplines falling within the scope of the proposed institute: mathematics, computer science, statistics, applied mathematics, business and engineering. We are pleased to encourage research and pedagogy of the proposed institute, particularly because they leverage these disciplines to advance the methodologies of simulation and stochastic modeling, and analysis, as well as optimization.

In reviewing the proposal, we found it to be comprehensive and well thought out. The mission and goals of the proposed institute are consistent with IBM’s strategic areas related to deployment of advanced analytics and optimization to solve complex problems in practice. We applaud the institute’s intended focus toward simulation, stochastic modeling and optimization, with an eye for application and benefit for government and private industry. Within IBM Research, over and over, we have found that a balance between research and applied problem solving is an effective means to advance the methodologies of applied mathematics and statistics. Thus, we feel that the operating structure proposed for the institute is a worthy model to follow.

The proposal mentions a few examples of important applications, which are consistent with our direct experience. For example, commodity pricing and their cycles exemplify
complex systems for which improved understanding through simulation and stochastic analysis may have far reaching implications. As an illustration, within the food industry, corn or soy prices impact complex system stakeholders from seed and fertilizer producers, to independent farmers, consumer product manufacturers, distributors, retailers, and of course the end consumer. Of course, the end consumer’s ultimate access to affordable and high quality nutrition depends on the pricing, stochastic nature, and interconnections of the entire delivery chain. Through IBM’s various initiatives on building a smarter planet, we’ve learned first hand how computer simulation and optimization may play a role in the sustainability and efficiency of buildings, urban planning systems, public transportation and in many forms of energy planning (including the storage and release processes related to hydroelectric and windmill energy, as mentioned in the proposal).

IBM Research is particularly interested in the advancement of simulation, stochastic modeling and optimization methodologies that are not only practical but scientifically sound. We recognize the “big data” potential, both in the data analyzed to formulate these models as well as in the data that stochastic simulation may create. To enable problem solvers in government and private sectors to make appropriate scientifically based conclusions, we do need on-going research in how to solve the models efficiently, and how to best use them to aid in human understanding. Students who are served by the proposed institute will enhance a workforce that desperately needs these problem solving skills. According to Christer Johnson, the IBM executive who leads IBM's Business Analytics and Optimization professional services for North America, "In the last year, our advanced analytics consulting business has grown over 100%. Almost every company we talk to agrees that advanced analytics is the key to creating competitive differentiation in the future." The focus of the proposed institute, on computer simulation, stochastic modeling and optimization, are central to advanced analytics. Thus, we view the proposed institute as an important activity to compete in the global marketplace and are delighted to express our strong support.

Sincerely,

Dr. Jane Snowdon and Dr. Mary Helander

Dr. Jane L. Snowdon, Senior Manager, Industry Solutions and Emerging Business Energy & Environment: Smarter Building Research IBM T. J. Watson Research Center Phone (914) 945-2422, Fax (914) 945-4268 email: snowdonj@us.ibm.com

Dr. Mary E. Helander, Master Inventor, Math Scientist, Research Relationship Manager, Consumer Products Industry IBM T.J. Watson Research Center Phone (914) 945-2019, Fax (914) 945-3434 Email : helandm@us.ibm.com
December 13, 2011

To the CUNY Board of Trustees

Re: Support letter for the proposed CUNY Institute CoSSMO

Dear Members of the Board:

This is a joint letter to express our strong support for the proposal by Professors Felisa Vázquez-Abad and Ted Brown to create a new CUNY Institute for Computer Simulation, Stochastic Modeling and Optimization.

The proposed CoSSMO Institute will add great value to CUNY research generally, and to that of other CUNY Institutes, specifically. The new Institute will complement our own work through the expertise in Computer Science and mathematical modeling. Professors Vázquez-Abad and Brown have developed a new and innovative research agenda within the proposed Institute. The interaction between the CoSSMO the CISC (CUNY Institute for Sustainable Cities) and the UTRC (University Transportation Research Center) is likely to foster and promote many interdisciplinary projects and greatly enhance our prospects of successfully attracting external research funding. These types of interdisciplinary activities are at the core on many new National Science Foundation initiatives.

The new Institute will be a further expression of CUNY’s continuing and growing interest in cutting edge scientific research and will undoubtedly bring greater visibility for CUNY and its programs.

William Solecki and Robert Paaswell
Biographical Information

William Solecki, Ph.D.
Director of the CUNY Institute for Sustainable Cities
Professor of Geography, Hunter College

Dr. Solecki’s research focuses on urban environmental change and transition, and climate change and cities. He is the Director of the CUNY Institute for Sustainable Cities and Professor of Geography at Hunter College-CUNY. He served as an author of the IPCC AR4 and now again on the IPCC AR5, as a member of the scientific steering committee of IHDP, Urbanization and Global Environmental Change Core (UGEC) Project, and as panel member on U.S. National Research Council committees. He has been appointed as the convening lead author for the Urban, Infrastructure, and Vulnerability chapter of the now-underway U.S. National Climate Assessment. He is a co-founder of the Urban Climate Change Research Network (UCCRN) and co-editor of the recent Climate Change and Cities Assessment (ARC3) Report. He has served as the co-leader of several climate impacts studies in the greater New York and New Jersey region, including the New York City on Panel on Climate Change (NPCC).

Robert E Paaswell, PhD, Dist. M. ASCE
Distinguished Professor of Civil Engineering, City College of New York
Director, CUNY Institute for Urban Systems
Director Emeritus, University Transportation Research Center

Robert E. Paaswell is Director of the CUNY Institute for Urban Systems of the federally supported University Transportation Research Center (UTRC). He has ample expertise in optimization and modeling of transportation networks and has been with City University (CCNY) for over ten years. Paaswell is extremely active in Public Transportation Issues and consulting. He has reported on governance structures for U.S. Transit organizations, Public -Private issues in New York and Chicago, Labor Union/Management issues. Most recently he served as an advisor to the Israeli government concerning restructuring of their bus companies, and issues of competition. He recently served as Chairman of the Board of the Transit Standards Consortium - a new professional group addressing the problems of integration of high technology into public transit systems. He has been elected a Distinguished Member of the ASCE and Chair of their Committee on Peer Review of Public Agencies. He is an appointed member of the Governor's (NY) Commission on Higher Education and an appointed member of the NY MTA Blue Ribbon Panels on Workforce Development and Construction Excellence.
November 6, 2012

Dear Professor Vazquez-Abad:

As you know, I am currently pursuing a second undergraduate degree at Hunter College. Prior to re-entering the academic world I was - at various times - a student with no real world experience, a newly-minted graduate entering the workforce for the first time and a professional working in law and finance. I have worked with, trained and managed students and recent graduates; I have also worked with and managed people who work in, for lack of a better phrase, information technology.

It is from this perspective that I am writing to express my support for the establishment of The CUNY Institute for Computer Simulation, Stochastic Modeling and Optimization ("CoSSMO") and its guiding principles for educating and training students, promoting academic research and meeting the needs of industry.

Of course, the ultimate purpose of any program to be offered by an educational institution such as CUNY should be to further knowledge and to enhance the education of its students. While you have articulated the many advantages of uniting academics and industry, I'd like to point out (in no particular order) a few specific benefits that I envision based on my own experience:

- Encouraging students to complete a rigorous course of study. Of the many educational benefits you enumerate, the one I believe is most immediately relevant to students - undergraduates in particular - is the opportunity to apply what is learnt in the classroom to "real world" situations. I feel certain that I am not the only student who has questioned the usefulness of what was being taught in the classroom - "why do we need to know this? How is this relevant? What is the point of this exercise?" By combining academics and real world experience to provide learning opportunities, I believe CoSSMO can encourage and motivate students to continue to pursue the study of science and mathematics.

- Exposing students to specific career opportunities. Having interviewed many job applicants and worked with many well-credentialed students and recent graduates with only a vague understanding of what a particular position requires on a day-to-day basis, it seems to me that -- absent the benefit of an internship or a personal connection to someone in a particular field -- many students may not know what it means to be a programmer, network administrator, engineer, lawyer, trader, banker, analyst. Giving students this insight by putting them in contact with industry professionals, is a clear benefit of participating in CoSSMO-sponsored projects. In addition, I hope it will also raise awareness that there are career opportunities for computer scientists in all industries (e.g. there are viable alternatives to the traditional
and/or “high profile” careers in technology such as working for a Google or IBM or Facebook or Electronic Arts or a start-up).

- Leveraging existing knowledge of students with prior work experience and providing younger students with broader perspective. Of course, I believe the multidisciplinary aspect of CoSSMO is one of its greatest strengths. One of the challenges I faced in my professional career was effectively communicating with programmers, developers, network engineers, etc. – understanding the limits of technology on the one hand and trying to convey the non-technical aspects of a particular project (substantive goals, regulatory limitations, budgetary constraints, among others) on the other. Not surprisingly, the most meaningful results were produced when both “sides” took the time to understand the context of the project in its entirety. More specifically, from the non-technical perspective, I have found that working with a “technical” person with an understanding of the substantive business concept resulted fewer mistakes, fewer resources consumed and, at time, unexpected solutions to problems arising from the addition of a new perspective. This seems to be exactly the type of integrated approach you envision for CoSSMO, creating synergies between academia and industry by entering into meaningful collaborations, matching ongoing research with issues facing industry and governments, and leveraging the diverse range of skills that CUNY professors and students – many of whom have had prior experience in industry -- bring to the table.

- Serving as an identifiable pool of talent for employers, particularly in the New York area. The small businesses I have worked for have had difficulty identifying and contacting potential candidates at the junior level. These companies did not have established recruiting programs, did not know where to begin their search and, quite frankly, reaching out to the career centers at the various local colleges and universities was neither helpful nor effective. CoSSMO can establish itself as a pipeline for developing talent so that companies will be able to readily identify potential candidates with a specific skill set who have already been, at some level, vetted. In particular, I believe that the multi-disciplinary facet of the CoSSMO initiative will be attractive to potential employers for the reasons set forth above.

I look forward to the official launch of CoSSMO and hope that I will have the opportunity to work with you in the future.

Sincerely,

Alison S. Wang
January 30, 2013

Provost Vita Rabinowitz
Hunter College
The City University of New York
695 Park Avenue
New York, NY 10021

Dear Provost Rabinowitz,

I am pleased to commit Brooklyn College’s support of the CoSSMO Institute in Computer Science proposal being submitted by Hunter College to the CUNY Board of Trustees. Brooklyn College will provide one course release for one faculty member per academic year to participate in CoSSMO. I would hope that the new Institute would provide opportunities for collaborative grants and the creation of new interdisciplinary curricula which would benefit the faculty and students of CUNY.

Best wishes for this proposal and I look forward to future cooperative endeavors.

Yours most sincerely,

William A. Tramontano
Provost & Senior Vice President for Academic Affairs

WAT:jg