Curriculum Vitae et Studiorum

PERSONAL INFORMATION

Name:	**Jocelyne Elias**
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CURRENT POSITION

- **Post-Doc** at the Department of Information Technology and Mathematical Methods, University of Bergamo (Italy). Currently, I am working on the design and planning of overlay networks, on game theoretical frameworks to study self-organized networks and cognitive radio networks, and also on dynamic resource provisioning in Quality of Service networks.
- **Lecturer** in "Architectures and Protocols for Internet", "Networking Laboratory", "Fundamentals of Telecommunications Networks" and "Computer Networks and Operating Systems", graduate and undergraduate courses (Politecnico di Milano and University of Bergamo, Italy).

FORMATION and TITLES

- **Ph.D. Degree (Doctorat de l'Université Paris 6)** in Information Technology, Telecommunications and Electronics, obtained cum laude in July 2006 at the Laboratory of Computer Sciences, Paris 6 (Laboratoire d'Informatique de Paris 6, LIP6), Pierre et Marie Curie University (UPMC), Paris, France. ''Mention: Très Honorable''.
    - Ph.D. thesis title: "Allocation Dynamique de la Bande Passante dans les Réseaux à Qualité de Service"
    - Advisors: Prof. Guy Pujolle and Prof. Dominique Gaïti.

- **Master's Degree (DEA, Diplôme d'Études Approfondies)** in Advanced Networks of Knowledge and Organization - Future Intelligent Communication Networks, University of Technology of Troyes, Troyes, France, 2003. ''Mention: Très Bien''.

- **Master degree** (with full marks) in Computer Sciences and Telecommunications Engineering, Lebanese University, Faculty of Engineering (ULFG 1), Tripoli, Lebanon, July 2002.

- **Assistant professor (Maître de Conférences) qualification**, delivered by the National Council of Universities (C.N.U.), Section 27 (Computer Science), France. February 2010.

PRIZES AND TRAVEL GRANTS

- I won the **Best Paper Award** prize at the PhDay 2008 conference (June 2008), organized by the Department of Electronics and Information (DEI) of Politecnico di Milano, Milan, Italy, for the paper entitled "Topology Design and Capacity Dimensioning of Service Overlay Networks".
- I was awarded a Student Travel Grant (STG) for the IEEE INFOCOM 2010 Conference (acceptance rate 23%).

DIDACTIC ACTIVITY

- Since 2004, I have been in charge of several didactic activities, both in France and in Italy, at the following universities: Institut Universitaire de Technologie (IUT) of Marne-la-Vallée (France), Politecnico di Milano and University of Bergamo (Italy). Based on my expertise and main fields of research, my teaching activity so far has been focused on networking and operating systems' courses.

Academic Year	Course	Level	University	Role	Hours
2009/2010	Internet Architectures and Protocols	Undergraduate and Graduate (Information Engineering and Economics)	University of Bergamo	Lecturer	40
2009/2010	Telecommunications Networks	Graduate (Information Engineering)	University of Bergamo	Teaching Assistant	6
2008/2009	Fundamentals of Telecommunications Networks	Undergraduate (Information Engineering)	Politecnico di Milano	Laboratory Responsible	20
2008/2009	Computer Networks and Operating Systems	Undergraduate (Information Engineering)	University of Bergamo	Teaching Assistant	8
2007/2008	Networking Laboratory	Undergraduate (Information Engineering)	University of Bergamo	Teaching Assistant	4
2007/2008	Telecommunications Networks	Graduate (Information Engineering)	University of Bergamo	Teaching Assistant	8
2007/2008	Fundamentals of Telecommunications Networks	Undergraduate (Information Engineering)	Politecnico di Milano	Laboratory Responsible	20
2005/2006	Operating Systems and Computer Architecture	Diplôme Universitaire de Technologie - Services et Réseaux de Communication (DUT-SRC)	IUT of Marne-la-Vallée, Meaux, France	Teaching Assistant	36
2005/2006	Networks	DUT – SRC	IUT of Marne-la-Vallée, Meaux, France	Teaching Assistant	32
2004/2005	Operating Systems and Computer Architecture	DUT – SRC	IUT of Marne-la-Vallée, Meaux, France	Teaching Assistant	60

TALKS AND SEMINARS

- Seminar, "**A Game Theoretic Framework for joint Routing and Pricing in Networks with Elastic Demands**", Pisa, Italy, October 2009.
- Invited Seminar, "**Joint routing and pricing in communications networks with elastic traffic: a game theoretical perspective**", MAESTRO Retreat, Avignon, France, September 2009.
- Seminar "**Very Large-Scale Neighborhood Search Algorithms for the Design of Service Overlay Networks**", Italian Networking Workshop, Cortina d'Ampezzo, Italy, January 2009.
- Invited Seminar "**Optimal Design of Service Overlay Networks**", INRIA Sophia Antipolis – Méditerranée, France, October 2008.
- Seminar "**Neighborhood based heuristics for the Hub Location Problem**", Dipartimento di Elettronica e Informazione (DEI), Politecnico di Milano, Italy, September 2008.
- Seminar "**Topology Design and Capacity Dimensioning of Service Overlay Networks**", PhDay 2008 conference, DEI, Politecnico di Milano, Italy, June 2008.
- Seminar "**Dynamic Bandwidth Allocation in Communication Networks**", Italian Networking Workshop, Bardonecchia, Italy, January 2007.
- Seminar "**Dynamic Resource Allocation in Communication Networks**", Networking 2006, Coimbra, Portugal, May 2006.
- Seminar "**Distributed Dynamic Bandwidth Provisioning in Quality of Service Networks**", Third EuroNGI Workshop on QoS and Traffic Control, Ecole Normale Supérieure (ENS), Paris, France, December 2005.
- Seminar "**Dynamic Resource Allocation in Quality of Service Networks**", Second EuroNGI Workshop on New Trends in Network Architectures and Services, Villa Vigoni, Como, Italy, July 2005.

COURSES PURSUED

Academic Year	Course	Organizing University	Hours
2009	Combinatorial Optimization and Telecommunications	Politecnico di Milano	10
2009	Cooperative Games, Mechanism Design, and Auctions	Politecnico di Milano	20
2008	Advanced Protocols for Multiple Access	Politecnico di Milano	20
2008	Recent Advances in Wireless Networking	Politecnico di Milano	20
2008	Game Theory with Application to Telecommunications	Politecnico di Milano	20
2008	Integer programming: Modeling and Solving Optimization Problems in Vehicle Routing	Politecnico di Milano	20
2007	Advanced Topics in Computer System Performance Analysis	Politecnico di Milano	20
2007	Advanced Methods in Numerical Transmissions 2	Politecnico di Milano	20
2007	Sensor Networks	Politecnico di Milano	20
2007	Wireless Networking: From Vehicles to Sensors	Politecnico di Milano	20
2004/2005	Introduction to Numerical Calculation with Matlab	ENST, Paris	12
2004/2005	Introduction to LaTeX	ENST, Paris	12
2003/2004	Professional English	UPMC, Paris	22
2003/2004	Security in Information Systems and Networks	UPMC, Paris	18

STUDENT SUPERVISION

- I have supervised several undergraduate and Master's degree thesis in France as well as in Italy, coordinating students' works and leading their research activities.

PARTICIPATION TO NATIONAL AND INTERNATIONAL RESEARCH PROJECTS

- Participation to the **PrimeLife** (Privacy and Identity Management in Europe for Life) **project,** funded by the European Commission's 7th Framework Programme (Post-doc from the 1st of February 2010).

- Participation to the **PRIN 2007 project SESAME** (Scalable Efficient Secure Autonomic MEsh networks), funded by the **Italian Ministry of Education and University,** for which I am studying and implementing novel algorithms and protocols for Wireless Mesh Networks. Research unit: Politecnico di Milano. Project coordinator: Prof. Antonio Capone (September 2008 – September 2010).

- Participation to the **Network of Excellence EURO-NF: Anticipating the Network of the Future – From Theory to Design**, by studying the applications of game theory to telecommunications networks in general and overlay networks in particular (2007-2009). Within the EURO-NF project, I spent 7 months as visiting researcher at the MAESTRO team, INRIA-Sophia Antipolis, France, in 2008-2009.

RESEARCH VISITS

- I have been Visiting Researcher at **LIA (Laboratoire Informatique d'Avignon), Université d'Avignon et des Pays de Vaucluse**, invited by Prof. Eitan Altman, from October 26, 2009 to November 15, 2009.
  I am cooperating with Prof. Altman and other members of LIA on several research topics related to Game Theory: selfish routing in telecommunications networks, dynamic spectrum access in Cognitive Radio Networks, and economic interactions between (Internet) Service Providers and users.
  Referee: Prof. Eitan Altman, INRIA Sophia Antipolis, 2004 Route des Lucioles - B.P. 93 FR - 06902 Sophia Antipolis Cedex, France.

- I have been Visiting Researcher at the **MAESTRO** team (director, Prof. Philippe Nain) at **INRIA Sophia Antipolis – Méditerranée**, from October 15, 2008 to January 15, 2009 and from July 1, 2009 to October 25, 2009.
  I am cooperating with the members of the MAESTRO team on selfish network design and applications of game theory to telecommunications and overlay networks (structured overlay and peer-to-peer networks).
  Referees: Prof. Philippe Nain, Prof. Eitan Altman, INRIA Sophia Antipolis, 2004 Route des Lucioles - B.P. 93 FR - 06902 Sophia Antipolis Cedex, France.

- I have been Visiting Researcher at the **Department of Information Technology and Mathematical Methods** of **University of Bergamo**, in 2005-2006.
  I worked in cooperation with Prof. Fabio Martignon, addressing several problems such as dynamic bandwidth allocation in QoS networks and overlay network planning.
  Referee: Prof. Fabio Martignon, University of Bergamo, Dalmine (BG) 24044, Italy.

- I have been Visiting Researcher at the Advanced Network Technologies Laboratory (ANTLab), Department of Electronics and Information (DEI), **Politecnico di Milano**, during May-July 2005, January-April 2006 and July-December 2006.
  I worked in cooperation with Professors Antonio Capone and Luigi Fratta to address the problem of dynamic bandwidth allocation in QoS networks. We have proposed a new service model and a broad set of efficient dynamic bandwidth allocation algorithms that take explicitly into account traffic statistics measured on-line and users' utility functions to increase users' benefit and network revenue.
  Referees: Prof. Luigi Fratta and Prof. Antonio Capone, Politecnico di Milano, 32, Piazza Leonardo da Vinci, 20133, Milano, Italy.

SCIENTIFIC COLLABORATIONS WITH COMPANIES

- In 2004, I have collaborated with the French company "Ginkgo Networks" to study and provide solutions for decentralized real-time network control and management mechanisms, thus resulting in significantly improved system performance (higher resource utilization, better QoS, increased service availability) for MPLS/GMPLS and domestic broadband networks.

ACTIVE COLLABORATIONS WITH INTERNATIONAL RESEARCH GROUPS AND RESEARCHERS

- Research team **MAESTRO, INRIA Sophia Antipolis – Méditerranée** and **LIA Laboratory, University of Avignon**. I am currently collaborating with the members of the MAESTRO team and LIA laboratory on several issues related to game theory applications to computer networks.

- **Laboratory of Paris 6 (LIP6)**, **University of Pierre et Marie Curie**. Since 2003, I have collaborated with the LIP6 networking research team on issues related to dynamic resource allocation in Quality of Service networks.

- **Operations Research and Discrete Optimization Group, Politecnico di Milano** (Italy). I am currently working in cooperation with the Network Optimization (NeO) laboratory in Politecnico di Milano, extending the Hub Location problem to the overlay network design problem.

- **University of Bergamo**: a fruitful collaboration exists with the Department of Information Technology and Mathematical Methods, University of Bergamo, since 2005, on several research issues like network design and dynamic bandwidth allocation in telecommunications networks.

CURRENT RESEARCH TOPICS

- **Wired and Overlay Networks:**

  - **Joint Routing and Pricing in Networks: A Game Theoretic Framework.** I studied the economic interactions between network users and providers in the following context:
    (1) users must ship their traffic from a source to a destination node, splitting it over multiple paths, each owned by an independent network provider; such users are charged a fixed price per unit of bandwidth used, and face both access and transport costs.
    (2) Network providers compete among themselves to cover network users, and set access and transport prices to maximize their revenue.

I provided sufficient conditions for the existence and uniqueness of the Nash equilibrium under a variety of cost functions, and I derived optimal price and routing settings. Finally, I analyzed and discussed several numerical examples that provide insights into the models' solution.

- **Distributed Overlay Network Design – A Game Theoretical Perspective.** I have introduced new distributed algorithms for the design of overlay networks, and in particular peer-to-peer networks (this consists in defining and investigating the interactions between client users, overlay operators and Internet service providers, which ensure connectivity at the IP layer). More specifically, I have studied the overlay network design problem from a game theoretic point of view, proposing novel socially-aware network design games. Finally, I provided bounds on the Price of Anarchy and other efficiency measures, and evaluated the performance of the proposed schemes in several network scenarios.

- **Design of Service Overlay Networks (SONs)**: I have developed novel mathematical models and heuristics for the planning of SONs. These models allow the operator to minimize the SON installation cost, while providing full coverage to all network's users, and to maximize its profit by further choosing which users to serve, based on the expected gain, and taking into consideration budget constraints. The proposed heuristics tackle large-size network topologies, providing near-optimal solutions in a reasonable computation time.

- **Dynamic Resource Allocation in Quality of Service (QoS) Networks**. I have studied and implemented a broad set of efficient algorithms that take explicitly into account the traffic statistics measured on-line and the users' utility functions to allocate network resources satisfying individual users' requirements, while maximizing, at the same time, the network revenue.
  I have also conceived and developed novel and flexible mathematical models for dynamic resource allocation, to study the quality of the performance achieved by resource allocation algorithms. The mathematical models provide upper bounds on the performance achievable by the heuristics proposed for the dynamic resource allocation problem.

- **Wireless Networks:**

  - **Dynamic Spectrum Access in Cognitive Radio Networks.** In this work I have studied the spectrum access problem in cognitive radio networks from a game theoretical perspective. The problem is modeled as a non-cooperative spectrum access game where secondary users access simultaneously multiple spectrum bands left available by primary users, optimizing their objective function. As a key innovative feature with respect to existing works, I modeled accurately the interference between secondary users, capturing the effect of spatial reuse. Furthermore, I considered both elastic and non elastic user traffic, to model real-time as well as data transfer applications. I determined sufficient conditions for the existence and uniqueness of the Nash equilibrium, and I derived equilibrium flow settings. Finally, I performed a thorough numerical analysis of the proposed model, studying the impact of several parameters, like the number of secondary users and wireless channels as well as the interference between secondary users, on the game efficiency.

EXPERIENCE AND TRAINING

- Master's Degree Stage (Stage de DEA) at LIP6 Laboratory, Paris, France, 2003 (6 months).
  Subject: Performance evaluation of reliable and active multicast transport protocols.
  I have implemented in Maple a broad set of reliable multicast protocols, and I have performed a comparison between these protocols in terms of the maximum achievable throughput.
  Referee: Prof. Kim Loan Thai, LIP6, 104, avenue du President Kennedy, 75016, Paris, France.

- Stage at LM2S laboratory (Laboratoire de Modélisation et Sûreté des Systèmes) (4 months), UTT University, Troyes, France, 2002.
  Subject: Study of the instantaneous frequency of a signal using time, frequency and wavelet transforms, application in ergonomics.
  I have accomplished this task developing a set of modules in Matlab and implementing an interactive graphical user interface using the Matlab Graphical User Interface (GUI), which permits to illustrate the output of the proposed model in function of the input signal and various system parameters.
  Referee: Prof. Jacques Duchêne, UTT, 12 Rue Marie Curie – B.P. 2060 - 10010 Troyes Cedex, France.

- Stage at Ericsson (2 months), Beirut, Lebanon, 2001.
  The goal of the stage was the study of GSM technology and its various applications.

- Stage at ED. ZUBLIN AG Branch Lebanon (5 months) in the Lebanese University Campus Project, Hadas, Beirut, Lebanon, 2000.
  The goal of this stage was to assist at the same time a number of office and on-site engineers, with work planning, supervising the work progress and reports writing, among others.

TECHNICAL SKILLS

- Network Simulation tools:
  - Network Simulator (NS): I have been in charge of teaching Ns within the courses "Fundamentals of Telecommunications Networks" (Politecnico di Milano) and "Networking Laboratory" (University of Bergamo).
  - J-Sim: I have a deep knowledge of the J-Sim simulator, an open simulation environment written in Java, for which I developed new modules to implement a broad set of efficient dynamic bandwidth allocation algorithms and mathematical models.

- Programming:
  - **C/C++**: I used these languages to code several optimization problems related to the design of overlay networks and the Hub Location problem.
  - **Java**: I used this language to implement a broad set of modules for the J-Sim network simulator during my Ph.D. studies related to the bandwidth allocation problem in QoS networks.
  - **Fortran, Visual Basic**: I have acquired a basic knowledge of these languages during my undergraduate studies at the university.
  - **Maple and Matlab.**
  - **CPLEX**, a high-performance software for mathematical programming and optimization: I have a deep experience with this software since I have used it to solve different kinds of problems like the bandwidth allocation problem in QoS networks and the design of Overlay Networks (centralized and distributed approaches).
  - **SNOPT**, a FORTRAN Package for large-scale nonlinear programming: I also used this software to solve non linear programming problems related to distributed resource allocation in wireless and cognitive radio networks.

- Operating Systems:
  - Linux: I have worked under this operating system to implement and execute several optimization algorithms coded in C/C++.
  - Windows.
  - Unix.

- Mathematical Modeling Languages:
  - AMPL, A Modeling Language for Mathematical Programming: I used AMPL to implement a set of novel mathematical models that optimize the total network revenue, providing theoretical bounds to the performance achievable by dynamic bandwidth allocation schemes. Furthermore, I used such modeling language to implement new models for the optimization of overlay networks and dynamic spectrum access in cognitive radio networks.

- Documentation and technical writing: I have acquired an important experience in technical writing by publishing several articles written in different languages (English and French) in prestigious networking journals (like IEEE Transactions on Network and Service Management, and Elsevier Computer Networks) and international conferences.

LANGUAGES

- **English**: excellent, written and spoken; I have written several articles in such language and participated to various international conferences.
- **French**: excellent, written and spoken; I have lived more than 4 years in France, attending the Ph.D. at Université UPMC (Paris), the Master's degree (DEA) at Université UTT (Troyes), and teaching at the IUT of Marne-la-Vallée.
- **Italian**: very good, written and spoken.
- **Arabic**: mother tongue.

EXPERIENCE AS REVIEWER AND CONFERENCE ORGANIZATION

- I have been *reviewer* for international networking journals and conferences such as IEEE Transactions on Vehicular Technology, Elsevier Computer Networks, Elsevier Computer Communications, IEEE Globecom, IEEE-IFIP Net-Con, IFIP Wireless Days and NGI.

- I have participated to the *organization* of the congress DNAC-PARIS'04 - "Contrôle, Maîtrise et Autonomie des Réseaux – Qualité de Service, Sécurité, Mobilité", which took place in Paris, France, from the 29th of November to the 1st of December 2004.

LIST OF SCIENTIFIC PUBLICATIONS:

International Journals

1. A Capone, J. ELIAS, F. Martignon, **Routing and Resource Optimization in Service Overlay Networks**, Elsevier Computer Networks, vol. 53, issue 2, pages 180-190, February 2009.
2. A Capone, J. ELIAS, F. Martignon, **Models and Algorithms for the Design of Service Overlay Networks**, IEEE Transactions on Network and Service Management, vol. 5, issue 3, pages 143-156, September 2008.

3. J. ELIAS, F. Martignon, A. Capone, G. Pujolle, **A New Approach to Dynamic Bandwidth Allocation in Quality of Service Networks: Performance and Bounds**, Elsevier Computer Networks, vol. 51, no. 10, 11 July 2007, pp. 2833-2853.
4. J. ELIAS, F. Martignon, A. Capone, G. Pujolle, **Distributed Algorithms for Dynamic Bandwidth Provisioning in Communication Networks**, Journal of Communications (JCM), vol. 1, no. 7, November-December 2006, pp. 47-56.

International Conferences

1. J. ELIAS, F. Martignon, **Joint QoS Routing and Dynamic Capacity Dimensioning with Elastic Traffic: A Game Theoretical Perspective**, accepted for publication in IEEE International Conference on Communications, ICC 2010, Cape Town, South Africa, May 2010.
2. J. ELIAS, F. Martignon, **Joint Spectrum Access and Pricing in Cognitive Radio Networks with Elastic Traffic**, accepted for publication in IEEE International Conference on Communications, ICC 2010, Cape Town, South Africa, May 2010.
3. J. ELIAS, F. Martignon, K. Avrachenkov, G. Neglia, **Socially-Aware Network Design Games**, in Proceedings of the 29th IEEE Conference on Computer Communications (INFOCOM 2010), March 2010, San Diego, CA, USA.
4. E. Altman, J. ELIAS, F. Martignon, **A Game Theoretic Framework for joint Routing and Pricing in Networks with Elastic Demands**, in Proceedings of the 4th International Conference on Performance Evaluation Methodologies and Tools (VALUETOOLS 2009), October 2009, Pisa, Italy.
5. A. Capone, J. ELIAS, F. Martignon, **Optimal Design of Service Overlay Networks**, in Proceedings of the Fourth International Telecommunication Networking Workshop on QoS in Multiservice IP Networks, IT-NEWS 2008, Venice, Italy, February 2008.
6. J. ELIAS, F. Martignon, A. Capone, **An Efficient Dynamic Bandwidth Allocation Algorithm for Quality of Service Networks**, in Autonomic Networking 2006 (INTELLCOMM 2006), Paris, France, 27-29 September 2006, also published in Springer Lecture Notes in Computer Science Volume #4195, pp. 132-145 (acceptance rate: 25%) .
7. A. Capone, J. ELIAS, F. Martignon, G. Pujolle, **Dynamic Resource Allocation in Communication Networks**, in Networking 2006, Coimbra, Portugal, 15-19 May 2006, also published in Springer Lecture Notes in Computer Science, Volume #3976, pp. 892-903 (acceptance rate: 20%).
8. A. Capone, J. ELIAS, F. Martignon, G. Pujolle, **Dynamic Resource Allocation in Quality of Service Networks**, Springer Lecture Notes in Computer Science Volume #3883, pp. 184-19, 2006.
9. A. Capone, J. ELIAS, F. Martignon, G. Pujolle, **Distributed Dynamic Bandwidth Provisioning in Quality of Service Networks**, in Proceedings of the Third EuroNGI Workshop on QoS and Traffic Control, Ecole Normale Supérieure (ENS), Paris, France, 7-9 December 2005.
10. A. Capone, J. ELIAS, F. Martignon, G. Pujolle, **Dynamic Resource Allocation in Quality of Service Networks**, in the Second EuroNGI Workshop on New Trends in Network Architectures and Services, Villa Vigoni, Como, Italy, July 13-15 2005.
11. J. ELIAS, D. Gaïti, **Contrôle de MPLS par l'utilisation des Systèmes Multiagents**, DNAC-PARIS'04, Paris, France, November-December 2004.
12. J. ELIAS, D. Gaïti, G. Pujolle, **Optimisation du Protocole MPLS par l'utilisation des Systèmes Multiagents**, in Proceedings of 6èmes Journées Doctorales Informatique et Réseau (JDIR'04), Lannion, France Télécom R&D, France, 2-4 November 2004.

National Conferences

1. J. ELIAS, F. Martignon, G. Carello, **Very Large-Scale Neighborhood Search Algorithms for the Design of Service Overlay Networks**, Italian Networking Workshop, Cortina d'Ampezzo, Italy, January 2009.
2. J. ELIAS, F. Martignon, A. Capone, G. Pujolle, **Dynamic Bandwidth Allocation in Communication Networks**, Italian Networking Workshop, Bardonecchia, Italy, January 2007.

Submitted Papers

1. J. ELIAS, F. Martignon, G. Carello, **Very Large-Scale Neighborhood Search Algorithms for the Design of Service Overlay Networks**, *subject to major revision*, Telecommunication Systems, September 2009.
2. J. ELIAS, F. Martignon, K. Avrachenkov, G. Neglia, **A Game Theoretic Analysis of Network Design with Socially-Aware Users**, submitted to Computer Networks, January 2010.
3. J. ELIAS, F. Martignon, Antonio Capone, Eitan Altman, **Competitive Interference-aware Spectrum Access in Cognitive Radio Networks**, submitted to WIOPT 2010, Avignon, France.

Thesis

1. J. ELIAS, **Allocation Dynamique de la Bande Passante dans les Réseaux à Qualité de Service**, Ph.D. dissertation, University of Pierre et Marie Curie, Paris, France, 3 July 2006.

Bergamo, 12/02/2010.

(Jocelyne Elias)