

Curriculum vitae



NAME: VALVERDE, SERGI

DATE: 01.11.2015

Surnames: VALVERDE CASTILLO
Identity card: 46599985 F

Name: SERGI
Birth date: 05/06/1973

Sex: M

Current professional situation

1) **Institution:** Universitat Pompeu Fabra

Department./Section./Unit: Department of Experimental and Health Sciences / Complex Systems Lab

Address: Dr. Aiguader 88, 08003, Barcelona

Website: <http://complex.upf.es/~sergi>

Email: sergi.valverde@upf.edu

ResearcherID: J-3275-2012

Scopus Author ID: 7006393703

ORCID ID: 0000-0002-2150-9610

2) **Institution:** Universitat Pompeu Fabra

Department./Section./Unit: Institute of Evolutionary Biology (CSIC-UPF)

Address: Psg. Marítim de la Barceloneta 37-49, 08003, Barcelona

Website: <http://www.ibe.upf-csic.es/people/postdoctoral/valverdesergi.html>

Phone: +34 659 28 03 93

Speciality (UNESCO codes): 22

Professional category: Visiting Professor

Administrative situation: Temporary

Dedication: Full Time

Research interests

Complex Systems, Network Science, Artificial Life, Evolutionary Algorithms, Scientific Visualisation, Cultural Evolution, Nestedness, Modularity, Scale-free Networks.

Curriculum Summary

Sergi Valverde is a visiting professor in the degree of Biomedical Engineering at Universitat Pompeu Fabra (UPF), from the Department of Experimental and Health Sciences (DCEXS) and member of the Complex Systems Lab and the Institute of Evolutionary Biology. He holds a Degree in Informatics Engineering and a PhD in Applied Physics by the Universitat Politècnica de Catalunya (UPC). His long-term research goal is to understand the common design principles and evolutionary dynamics of living and artificial systems. Sergi has 15-years of expertise in the areas of complex systems and computer simulation and he has published more than 48 peer-review related articles in network science, systems biology, collective intelligence and technological and cultural evolution (Google Scholar: 3028 citations, H-index: 27). He is member of the Complex Systems Society (CSS) Council (2016-2018). Sergi was involved in the three major IST FET FP6 projects in Complex Systems (PACE, ECAGents and DELIS). He is now coordinating the project CLUSTECH (Detecting Emerging Technologies in Innovation Networks), funded by the Spanish Agency of Science and Technology.

Education

Degree	Institution	Date
Informatics Engineering	Universitat Politècnica Catalunya	13/07/1999
PhD Applied Physics	Universitat Politècnica Catalunya	19/01/2006

Director of Thesis: Ricard V. Solé

Experience and job history / Former academic positions

Position	Institution	Date
Research Engineer	El Periodico de Catalunya	1996 - 1999
Research Engineer	Ubisoft Entertainment	1999 - 2004
Phd Student	Universitat Pompeu Fabra	2004 - 2006
Postdoctoral Researcher	Universitat Pompeu Fabra	2006 - 2007
Postdoctoral Researcher	Université Paul Sabatier	2007 - 2009
Visiting Professor	Universitat Pompeu Fabra	2009 - current

Languages (R = regular, B = good, C = correctly)

Language	Speaking	Reading	Writing
Spanish	C	C	C
Catalan	C	C	C
English	C	C	C

Research projects

(national and/or international)

Project title: DYNAMICALLY EVOLVING, LARGE-SCALE INFORMATION SYSTEMS (DELIS)

Funding organization: Complex Systems Initiative, 6th Framework Program, European Union

Participant organizations: Universitaet Paderborn, University of London, Consorzio Universita Industria, Université Paris XI, Politechnika Wroclawska, Univerzita Karlova V Praze, Universitat Pompeu Fabra, Universitaet Karlsruhe, Max-Planck Gesellschaft Zur Foerderung Der Wissenschaft.

Duration, from: 01/01/2004 **until:** 31/12/2007

Quantity of the subsidy: 4.500.000,00 **euros**

Responsible researcher: FRIEDHELM MEYER AUF DER HEIDE

Number of participant researchers: 20

Project title: EMBODIED AND COMUNICATING AGENTS (ECAGENTS)

Funding organization: Complex Systems Initiative, 6th Framework Program, European Union

Participant organizations: Université Libre de Bruxelles, Institute for Advanced Studies, Collegium Budapest, Universitat Pompeu Fabra, University of Goteborg, Humboldt Universitat, Universita La Sapienza, University of Tokyo

Duration, from: 01/01/2004 **until:** 31/12/2007

Quantity of the subsidy: 4.300.000,00 **euros**

Responsible researcher: STEFANO NOLFI

Number of participant researchers: 20

Project title: PROGRAMMABLE ARTIFICIAL CELL EVOLUTION (PACE)

Funding organization: Complex Systems Initiative, 6th Framework Program, European Union

Participant organizations: Ruhr-Universitaet Bochum, Ca' Foscari University of Venice, University of Copenhagen, Chalmers University of Technology, Universitat Pompeu Fabra, University of Zurich, Vilnius University, ProtoLife s.r.l., University of Southern Denmark

Duration, from: 01/01/2004 **until:** 31/12/2007

Responsible researcher: STEFANO NOLFI

Number of participant researchers: 20

Project title: ORIGINS OF INNOVATION IN TINKERED NETWORKS

Funding organization: James McDonnell Foundation

Participant organizations: Universitat Pompeu Fabra

Duration, from: 01/01/2006 **until:** 31/12/2010

Quantity of the subsidy: 460.000 **euros**

Responsible researcher: RICARD V. SOLÉ

Number of participant researchers: 2

Project title: SOCIAL INSECT NESTS AS 3D NETWORKS: MORPHOGENESIS AND STRUCTURAL DESIGNS(MESOMORPH)

Funding organization: Agence Nationale de la Recherche, Biologie Systémique programme

Participant organizations: Université Paul Sabatier

Duration, from: 01/01/2007 **until:** 31/12/2009

Quantity of the subsidy: 500.000 **euros**

Responsible researcher: GUY THERAULAZ

Number of participant researchers: 8

Project title: FIS2009-12365 - Computación. Replicación y rotura de simetría en sistemas protocelulares

Funding organization Ministerio de Ciencia e Innovación

Participant organizations: Universitat Pompeu Fabra

Duration, from: 01/01/2010 **until:** 31/12/2013

Quantity of the subsidy: 89.540 euros

Responsible researcher: RICARD V. SOLÉ

Number of participant researchers: 7

Project title: FIS2013-44674-P - Detección de Tecnologías Emergentes en Redes de Innovación

Funding organization Ministerio de Economía y Competitividad

Participant organizations: Universitat Pompeu Fabra

Duration, from: 01/01/2015 **until:** 31/11/2017

Quantity of the subsidy: 12,000 euros

Responsible researcher: SERGI VALVERDE

Number of participant researchers: 1

Publications

Key (A: Article, R:Review, CL:Book Chapter, L: Book). The full listing of publication with citation counts is available in Google Scholar: <http://scholar.google.com/citations?user=hA2laXkAAAAAJ&hl=en>

Subject Areas: Biochemistry, Genetics and Molecular Biology, Chemical Engineering, Computer Science, Agricultural and Biological Sciences, Engineering, Immunology and Microbiology, Physics and Astronomy, Materials Science, Medicine, Environmental Science, Earth and Planetary Sciences, Arts and Humanities, Mathematics, Multidisciplinary, Energy.

1. **Authors (by order of signature):** Solé, Ricard V.; Ferrer-Cancho, Ramon; Montoya, José M.; Valverde, Sergi

Title: «Selection, tinkering and emergence in complex networks»

In: *Complexity*

Key: A **Vol.:** 8 **Pages, initial:** 20 **final:** 33 **Date:** 2002

2. **Authors (by order of signature):** Solé, Ricard V.; Valverde, Sergi

Title: «Information transfer and phase transitions in a model of internet traffic»

In: *Physica A*

Key: A **Vol.:** 289 **Pages, initial:** 595 **final:** 605 **Date:** 2002

Place of publication Amsterdam

3. **Authors (by order of signature):** Valverde, Sergi; Ferrer-Cancho, Ramon; Solé, Ricard V.

Title: «Scale free networks from optimal design»

In: *Europhysics Letters*

Key: A **Vol.:** 60 **Pages, initial:** 512 **final:** 517 **Date:** 2002

Publisher (if book):

Place of publication Petit-Lancy

4. **Authors (by order of signature):** Valverde, Sergi; Solé, Ricard V.

Title: «Self-organized critical traffic in parallel computer networks»

In: *Physica. A*

Key: A **Vol.:** 312 **Pages, initial:** 636 **final:** 648 **Date:** 2002

Place of publication Amsterdam

5. **Authors (by order of signature):** Buhl, Jerome; Gautrais, Jacques; Solé, Ricard V.; Valverde, Sergi; Deneubourg, Jean-Louis; Theraulaz, Guy

Title: «Efficiency and robustness in ant networks of galleries»

In: *European Physical Journal: Special Topics*

Key: A **Vol.:** 42 **Pages, initial:** 123 **final:** 129 **Date:** 2004

Place of publication France

6. **Authors (by order of signature):** Solé, Ricard V.; Valverde, Sergi

Title: «Information theory of complex networks: on evolution and architectural constraints»

In: *Lecture Notes in Physics*

Key: A **Vol.:** 650 **Pages, initial:** 189 **final:** 207 **Date:** 2004

Place of publication Berlin

7. **Authors (by order of signature):** Valverde, Sergi; Solé, Ricard V.

Title: «Internet's critical path horizon»

In: *European Physical Journal: Special Topics*

Key: A **Vol.:** 38 **Pages, initial:** 245 **final:** 252 **Date:** 2004

Place of publication France

8. **Authors (by order of signature):** Valverde, Sergi; Solé, Ricard V.

Title: «Logarithmic growth dynamics in software networks »

In: *Europhysics Letters*

Key: A **Vol.:** 72 **Pages, initial:** 858 **final:** 864 **Date:** 2005

Place of publication Petit-Lancy

9. Authors (by order of signature): Buhl, Jerome; Gautrais, Jacques; Reeves, Nicolas; Solé, Ricard V.; Valverde, Sergi; Kuntz, Pascale; Theraulaz, Guy

Title: «Topological patterns in street networks of self-organized urban settlements»

In: *European Physical Journal: Special Topics*

Key: A **Vol.:** 49 **Pages, initial:** 513 **final:** 522 **Date:** 2006

Place of publication France

10. Authors (by order of signature): Solé, Ricard V.; Valverde, Sergi

Title: «Are network motifs the spandrels of cellular complexity?»

In: *Trends in ecology & evolution*

Key: A **Vol.:** 21 **Pages, initial:** 419 **final:** 422 **Date:** 2006

Place of publication Amsterdam

11. Authors (by order of signature): Valverde, Sergi; Theraulaz, Guy; Gautrais, Jacques; Fourcassié, Vincent; Solé, Ricard V.

Title: «Self-organization patterns in wasp and open source communities»

In: *IEEE Intelligent Systems*

Key: A **Vol.:** 21 **Pages, initial:** 36 **final:** 40 **Date:** 2006

Place of publication New York

12. Authors (by order of signature): Corominas-Murtra, Bernat; Valverde, Sergi; Rodriguez-Caso, Carlos; Solé, Ricard V.

Title: «K-scaffold subgraphs in complex networks »

In: *Europhysics Letters*

Key: A **Vol.:** 77 **Pages, initial:** 18004 **Date:** 2007

Place of publication Petit-Lancy

13. Authors (by order of signature): Solé, Ricard V.; Valverde, Sergi

Title: «Spontaneous emergence of modularity in cellular networks »

In: *Journal of the Royal Society interface*

Key: A **Vol.:** 5 **Pages, initial:** 129 **final:** 133 **Date:** 2007

Place of publication London

14. Authors (by order of signature): Valverde, Sergi; Solé, Ricard V.; Packard, Norman; Bedau, Mark

Title: «Topology and evolution of technology innovation networks»

In: *Physical Review. E, Statistical, Nonlinear, and Soft Matter Physics*

Key: A **Num:** 5 **Vol.:** 76 **Pages, initial:** 056118 **Date:** 2007

Place of publication United States

15. Authors (by order of signature): Valverde, Sergi; Solé, Ricard V.

Title: «Hierarchical small-worlds in software architecture»

In: *Dynamics of Continuous, Discrete and Impulsive Systems Series B: Applications and Algorithms*

Key: A **Vol.:** 14 **Pages, initial:** 1 **final:** 14 **Date:** 2007

Place of publication Canada

16. Authors (by order of signature): Valverde, Sergi; Solé, Ricard V.

Title: «Self-Organization versus hierarchy in open source social networks»

In: *Physical Review. E, Statistical, Nonlinear, and Soft Matter Physics*

Key: A **Num:** 4 **Vol.:** 76 **Pages, initial:** 046118 **Date:** 2007

Place of publication United States

17. Authors (by order of signature): Mestres, Jordi; Gregori-Puigjané, Elisabet; Valverde, Sergi; Solé, Ricard V.

Title: «Data completeness: The achilles hell of drug-target networks»

In: *Nature biotechnology*

Key: A **Vol.:** 26 **Pages, initial:** 983 **final:** 984 **Date:** 2008

Place of publication New York

18. Authors (by order of signature): Perna, Andrea; Jost, Christian; Coturier, Etienne; Valverde, Sergi; Douady, Stephane; Theraulaz, Guy

Title: «The structure of gallery networks in the nests of termite *Cubitermes* sp. revealed by X-ray tomography »

In: *Die Naturwissenschaften*

Key: A **Vol.:** 95 **Pages, initial:** 877 **final:** 884 **Date:** 2008

Place of publication Germany

19. Authors (by order of signature): Perna, Andrea; Jost, Christian; Valverde, Sergi; Gautrais, Jacques; Theraulaz, Guy; Kuntz, Pascale

Title: «The Topological Fortress of Termites»

In: *Lecture Notes in Computer Science / Artificial Intelligence*

Key: A **Vol.:** 5151 **Pages, initial:** 165 **final:** 173 **Date:** 2008

Place of publication Berlin

20. Authors (by order of signature): Perna, Andrea; Valverde, Sergi; Gautrais, Jacques; Jost, Christian; Solé, Ricard V.; Kuntz, Pascale; Theraulaz, Guy

Title: «Topological efficiency in three-dimensional gallery networks of termite nests»

In: *Physica. A*

Key: A **Vol.:** 387 **Pages, initial:** 6235 **final:** 6244 **Date:** 2008

Place of publication Amsterdam

21. Authors (by order of signature): Solé, Ricard V.; Rosas Casals, Marti; Corominas-Murtra, Bernat; Valverde, Sergi

Title: «Robustness of the European power grids under intentional attacks»

In: *Physical Review. E. Statistical Physics, Plasmas, Fluids, and Related Interdisciplinary Topics*

Key: A **Vol.:** 77 **Pages, initial:** 026102 **Date:** 2008

Place of publication New York

22. Authors (by order of signature): Valverde, Sergi

Title: «Crossover from endogenous to exogenous activity in open-source software development »

In: *Europhysics Letters*

Key: A **Num.:** 2 **Vol.:** 77 **Pages, initial:** 20002 **Date:** 2008

Place of publication Petit-Lancy

23. Authors (by order of signature): Challet, Damien; Valverde, Sergi

Title: «Fat Tails, Long Memory, Maturity and Ageing in Open-Source Software»

In: *PHYSCOMNET 2008 The 1st Workshop on Physics-Inspired Paradigms in Wireless Communications and Networks*

Key: CL **Date:** 2008

24. Authors (by order of signature): Corominas-Murtra, Bernat; Valverde, Sergi; Solé, Ricard V.

Title: «The ontogeny of scale-free syntax networks: phase transitions in early language»

In: *Advances in Complex Systems*

Key: A **Vol.:** 12 **Pages, initial:** 371 **final:** 392 **Date:** 2009

Place of publication New York

25. Authors (by order of signature): Mestres, Jordi; Gregori-Puigjané, Elisabet; Valverde, Sergi; Solé, Ricard V.

Title: «The topology of drug-target interaction networks: implicit dependence on drug properties and target families»

In: *Molecular BioSystems*

Key: A **Num.:** 9 **Vol.:** 5 **Pages, initial:** 1051 **final:** 1057 **Date:** 2009

Place of publication United Kingdom

25. **Authors (by order of signature):** Valverde, Sergi; Corominas-Murtra, Bernat; Perna, Andrea; Kuntz, Pascale; Theraulaz, Guy; Solé, Ricard V.

Title: «Percolation in insect nest networks: evidence for optimal wiring»

In: *Physical Review. E, Statistical, Nonlinear, and Soft Matter Physics*

Key: A **Num.:** 6 **Vol.:** 79 **Pages, initial:** 066106 **Date:** 2009

Place of publication United States

26. **Authors (by order of signature):** Valverde, Sergi; Solé, Ricard V.

Title: «Motifs in Graphs »

In: *Encyclopedia of Complexity and Systems Science*

Key: CL **DOI:**10.1007/978-0-387-30440-3_339 **Pages, initial:** 5692 **final:** 5702 **Date:** 2009

Publisher (if book): Springer New York

27. **Authors (by order of signature):** Valverde, Sergi

Title: *Evolution of Technology Innovation Networks en el libro de la Exposición Culturas del Cambio: Átomos Sociales y Vidas Electrónicas*

Key: CL **Date:** 2009

Publisher (if book): Centro de Arte Santa Monica

Place of publication: Barcelona

28. **Authors (by order of signature):** Solé, Ricard; Corominas Murtra, Bernat; Valverde, Sergi; Steels, Luc

Title: «Language networks: Their structure, function, and evolution»

In: *Complexity*

Key: A **Num.:** 6 **Vol.:** 15 **Pages, initial:** 20 **final:** 26 **Date:** 2010

Place of publication Hoboken

29. **Authors (by order of signature):** Corominas Murtra, Bernat; Valverde, Sergi; Solé, Ricard V.

Title: «Emergence of Scale-Free Syntax Networks»

In: *Evolution of Communication and Language in Embodied Agents*

Key: CL **Pages, initial:** 83 **final:** 101 **Date:** 2010

Publisher (if book): Springer

Place of publication: Berlin Heidelberg

30. **Authors (by order of signature):** Horta, Ricard; Rosas-Casals, Marti; Valverde, Sergi

Title: «Discerning Electricity Consumption Patterns from Urban Allometric Scaling»

In: *IEEE COMPENG 2010 PROCEEDINGS*

Key: CL **Pages, initial:** 49 **final:** 51 **Date:** 2010

Publisher (if book): IEEE

31. **Authors (by order of signature):** Flores, Cesar O.; Meyer, Justin R.; Valverde, Sergi; Farr, Lauren; Weitz, Joshua S.

Title: «Statistical structure of host-phage interactions»

In: *Proceedings of the National Academy of Sciences of the United States of America*

Key: A **Num.:** 28 **Vol.:** 108 **Pages, initial:** 288 **final:** 297 **Date:** 2011

Place of publication Washington

32. **Authors (by order of signature):** Solé, Ricard V.; Valverde, Sergi; Rodríguez-Caso, Carlos

Title: «Convergent evolutionary paths in biological and technological networks»

In: *Evolution*

Key: A **Num.:** 3 **Vol.:** 4 **Pages, initial:** 415 **final:** 426 **Date:** 2011

Place of publication Lawrence, Kansas.

33. **Authors (by order of signature):** Antó JM, Pinart M, Akdis M, Auffray C, Bachert C, Valverde, Sergi, [et.al.]

Title: «Understanding the complexity of IgE-related phenotypes from childhood to young adulthood: a Mechanisms of the Development of Allergy (MeDALL) seminar»

In: *The Journal of Allergy and Clinical Immunology*

Key: A **Num.:** 4 **Vol.:** 129 **Pages, initial:** 943 **final:** 954 **Date:** 2012
Place of publication St. Louis

34. Authors (by order of signature): Flores, Cesar; Valverde, Sergi; Weitz, Joshua S.
Title: «Multi-scale structure and geographics drivers of cross-infection within marine bacteria and phages»
In: *The ISME Journal: Multidisciplinary Journal of Microbial Ecology*
Key: A **Num.:** 3 **Vol.:** 7 **Pages, initial:** 520 **final:** 532 **Date:** 2012
Place of publication United Kingdom

35. Authors (by order of signature): Solé, Ricard V.; Valverde, Sergi
Title: «Before the endless forms: embodied model of transition from singles cells to aggregates »
In: *PLoS ONE*
Key: A **Num.:** 4 **Vol.:** 8 **Date:** 2012
Place of publication United States

36. Authors (by order of signature): Solé, Ricard V.; Valverde, Sergi; Rosas-Calas, Marti; Kauffman, Stuart; Farmer, Doyne; Eldredge, Niles
Title: «The evolutionary ecology of technological innovations»
In: *Complexity*
Key: A **Num.:** 4 **Vol.:** 18 **Pages, initial:** 15 **final:** 27 **Date:** 2012
Place of publication Amsterdam

37. Authors (by order of signature): Valverde, Sergi; Solé, Ricard V.; Santiago, Elena
Title: «Evolved modular epistasis in artificial organisms»
In: *Proceedings of Artificial Life XII, MIT Press*
Key: CL **Date:** 2012

38. Authors (by order of signature): Solé, Ricard V.; Valverde, Sergi
Title: «Macroevolution in silico: scale, constraints and universals»
In: *Palaeontology*
Key: A **Num.:** 6 **Vol.:** 56 **Pages, initial:** 1327 **final:** 1340 **Date:** 2013
Place of publication London

39. Authors (by order of signature): Valverde, Sergi; Solé, Ricard V.
Title: «Networks and the City»
In: *Architectural design*
Key: A **Num.:** 4 **Vol.:** 83 **Pages, initial:** 112 **final:** 119 **Date:** 2013
Place of publication London

40. Authors (by order of signature): Weitz JS, Poisot T, Meyer JR, Flores CO, Valverde S. Sullivan MB, Hochberg ME
Title: «Phage-bacteria infection networks»
In: *Trends in microbiology*
Key: A **Num.:** 2 **Vol.:** 21 **Pages, initial:** 82 **final:** 91 **Date:** 2013
Place of publication: Oxford

41. Authors (by order of signature): Solé, R.V., Valverde, S., Rodriguez-Caso, C, Sardanyes, J.
Title: «Can a minimal replicating construct be identified as the embodiment of cancer?»
In: *Bioessays*
Key: A **Num.:** 36 **Vol.:** 5 **Pages, initial:** 503 **final:** 512 **Date:** 2014

42. Authors (by order of signature): Hillung, J., Cuevas, J.M., Valverde, S., Elena, S.F.
Title: «Experimental evolution of an emerging plant virus in host genotypes that differ in their susceptibility to infection»
In: *Evolution*
Key: A **DOI:**10.1111/evo.12458 **Date:** 2014

43. **Authors (by order of signature):** Valverde, S.

Title: «Evolution of patent citation networks»

In: *Proceedings Workshop on Complexity in Engineering (COMPENG' 2014)*

Key: A **Date:** 2014

Publisher (if book): IEEE

44. **Authors (by order of signature):** Gautrais, J., Buhl, J., Valverde, S., Kuntz, P., Theraulaz, G.

Title: «The role of colony size on tunnel branching morphogenesis in ant nests »

In: *PLoS ONE*

Key: A **Num.:** 10 **Vol.:** 9 **Pages, initial:** e109436 **Date:** 2014

Place of publication: United States

45. **Authors (by order of signature):** Valverde, Sergi; Solé, Ricard V.

Title: *Exploring Complex Networks: A statistical physics view*

Key: L **Expected date:** 2015

Publisher (if book): Princeton University Press

46. **Authors (by order of signature):** Solé, R.V., Amor, D. R., Valverde, S.

Title: «On singularities in combination-driven models of technological innovation »

Submitted: *Nature Scientific Reports*

Key: A **Date:** 2014

47. **Authors (by order of signature):** Valverde, S., Solé, R.V

Title: «Punctuated Equilibrium in the large scale evolution of programming languages »

Submitted: *Journal of the Royal Society Interface*

Key: A **Date:** 2015

48. **Authors (by order of signature):** Valverde, S., Solé, R.V

Title: «A Cultural Diffusion Model for the Rise and Fall of Programming Languages»

Submitted: *Journal of Human Biology*

Key: A **Date:** 2015

49. **Authors (by order of signature):** Valverde, S., Ohse, S., Turalska, M., Garcia-Ojalvo, J., West B. J.

Title: « Structural Determinants of Criticality in Biological Networks »

Accepted for publication in: *Frontiers in Fractal Physiology*

Key: R **Date:** 2015

Stays abroad

(continuous stays exceeding one month)

Institution: Santa Fe Institute

Place: Santa Fe **Country:** USA **Date:** 01/09/2006 - 20/11/2006

Duration (weeks): 11

Key: Research Collaboration

Institution: Université Paul Sabatier

Place: Toulouse **Country:** France **Date:** 01/01/2007 - 01/06/2009

Duration (weeks): 125

Subject: Swarm Intelligence

Key: Postdoc

Institution: Santa Fe Institute

Place: Santa Fe **Country:** USA **Date:** 01/03/2007 - 17/05/2007

Duration (weeks): 10

Key: Research Collaboration

Talks & Presentations

1. **Authors:** Valverde, Sergi

Title: Complexity in Computer Networks

Congress: The Global Internet: Measurement, modeling & Analysis

Place of celebration: Leiden **Date:** 2000

2. **Authors:** Valverde, Sergi

Title: Origins of Software Complexity

Congress: Software Complexity Workshop Conference (IST2004)

Place of celebration: Den Haag **Date:** 2004

3. **Authors:** Valverde, Sergi

Title: Universal Properties of Bipartite Software Graphs

Congress: Workshop on Software and Complex Systems, 9th IEEE Int. Conf. Eng. Compl. Comp. Syst.

Place of celebration: Florence **Date:** 2004

4. **Authors:** Valverde, Sergi

Title: Network Motifs in Computational Networks: A Case Study in Software Architecture

Congress: Nordic Workshop on Networks

Place of celebration: Copenhagen **Date:** 2004

5. **Authors:** Valverde, Sergi

Title: Information Theory of Class Graphs: On Evolution and Architectural Constraints

Congress: Workshop on Complexity and Self-Properties

Place of celebration: Brussels **Date:** 2005

6. **Authors:** Valverde, Sergi

Title: Xarxes tecnològiques: del Software a Internet

Congress: Curs Evolució de Xarxes Complexes

Place of celebration: Barcelona **Date:** 2005

7. **Authors:** Valverde, Sergi

Title: Noise and Reliable Computation: Von Neumann Revisited

Congress: Workshop on Evolution, Information and Computation: From Living to Non-Living Matter

Place of celebration: Venice **Date:** 2005

8. **Authors:** Valverde, Sergi

Title: Complejidad Tecnológica

Congress: Maratón científico: Sistemas Complejos, Virus, Hormigas y Cerebros

Place of celebration: Madrid **Date:** 2007

9. **Authors:** Valverde, Sergi

Title: Hierarchy and Emergence in Open-source Networks

Congress: DELIS Final Workshop and Review Meeting

Place of celebration: Barcelona **Date:** 2008

10. **Authors:** Valverde, Sergi

Title: Into the Turing's Nest

Congress: Selection, Tinkering and Emergence in Complex Networks (Santa Fe Business Meeting)

Place of celebration: Googleplex (California) **Date:** 2008

11. **Authors:** Valverde, Sergi

Title: Complex Networks: The Architecture of Life

Congress: 2a Edición Festival: Punto y Raya

Place of celebration: Barcelona **Date:** 2009

12. **Authors:** Valverde, Sergi

Title: Evolution of Technology Innovation Networks
Congress: CHANGING CULTURES: CULTURES OF CHANGE, ATACD Project
Place of celebration: Barcelona **Date:** 2009

13. **Authors:** Valverde, Sergi

Title: Percolation and Modularity in Insect Nest Networks
Congress: Workshop on Principles of Innovation in Swarm-made Architectures
Place of celebration: Venice **Date:** 2009

14. **Authors:** Valverde, Sergi

Title: Community Structure in a Patient-Phenotype Network
Congress: MeDALL Kick-off meeting
Place of celebration: Barcelona **Date:** 26/01/2011

15. **Authors:** Valverde, Sergi

Title: Networks of Innovation: from Patents to Open-source Software
Congress: I Jornada Complexitat.CAT
Place of celebration: Barcelona **Date:** 02/05/2011

16. **Authors:** Valverde, Sergi

Title: Hierarchy vs Self-organization in Open Source Networks
Congress: European Conference Complex Systems 2011
Place of celebration: Vienna **Date:** 15/09/2011

17. **Authors:** Valverde, Sergi

Title: Hierarchy vs Self-organization in Open Source Networks
Congress: Reunión del nodo español FuturICT
Place of celebration: Barcelona **Date:** 05/10/2011

18. **Authors:** Valverde, Sergi

Congress: SFI Workshop : Power Grids as Complex Networks
Place of celebration: Santa Fe, New Mexico **Date:** 17/05/2012-19/05/2012

19. **Authors:** Valverde, Sergi

Title: Hierarchy vs Self-organisation in Complex Networks
Host: Emergent Technologies & Design at the Architectural Association (AA)
Place of celebration: London **Date:** 06/06/2012

20. **Authors:** Valverde, Sergi

Title: Networks of Innovation
Congress: BioDesign Research Lab Lectures
Place of celebration: Barcelona **Date:** 29/11/2012

21. **Authors:** Valverde, Sergi

Title: Evolution of Patent Citation Networks
Congress: European Conference of Complex Systems (ECCS 2013)
Place of celebration: Barcelona **Date:** 16/09/2013-20/09/2013
Web: http://barabasilab.neu.edu/success_eccs2013

22. **Authors:** Valverde, Sergi

Title: Networks in Action: Communication, Computation and Evolution
Host: UPF-DTIC Research Seminars
Place of celebration: Barcelona **Date:** 12/06/2014.
Web: http://www.dtic.upf.edu/~afaridi/DTIC_Seminars/Abstracts.html#Jun12

23. **Authors:** Valverde, S.

Title: Evolution of Patent Citation Networks
Congress: Workshop on Complexity in Engineering (COMPENG 2014)

Place of celebration: Barcelona **Date:** 16/06/2014-17/06/2014

Web: <http://www.compeng2014.org>

24. **Authors:** Valverde, Sergi

Title: Phage-bacteria Infection Networks: From Nestedness to Modularity

Congress: Workshop on Virus Dynamics and Evolution

Place of celebration: Barcelona **Date:** 4/07/2014

Web: <http://www.crm.cat/en/Activities/Pages/ActivityFoldersAndPages/Curs%202013-2014/WKVirusDynamics/WKVirusDynamics.aspx>

25. **Authors:** Valverde, Sergi

Title: Innovation as a Complex System: Technological evolution and Emergence of Computational Creativity

Congress: Interactivos?14. Rethinking collective behaviour and action (Medialab-Prado)

Place of Celebration: Madrid

Web: <http://medialab-prado.es/article/ainnovacioncomounsistemacomplejoevoluciontecnologicayemergenciadelacreatividadcomputacional>

26. **Authors:** Valverde, Sergi

Title: Major Transitions in Technological Evolution

Workshop: Major Transitions in Natural, Synthetic and Artificial Evolution

Place of Celebration: Santa Fe Institute (USA) **Date:** 09/12/2014

Web: <http://www.santafe.edu/gevent/detail/science/1917/>

27. **Authors:** Valverde, Sergi

Title: Modelling the Evolution of Programming Languages: Network Methods in Cultural Evolution

Host: Complexity and Socio-Ecological Dynamics Research Group, Department of Humanities (UPF)

Place of Celebration: Barcelona **Date:** 06/03/2015

Web: <http://www.upf.edu/cases/actualitat/150306.html>

28. **Authors:** Valverde, Sergi

Title: Complex Networks: The Architecture of Life

Congress: II Jornades Breyting

Place of Celebration: Vidreres **Date:** 12/04/2015

Web: <http://www.jornadesbreyting.com/project/xarxes-complexes-larquitectura-de-la-vida/>

29. **Authors:** Valverde, Sergi

Title: Visualising the Evolution of Programming Languages

Congress: 6th Leonardo Satellite Symposium at NetSci2015

Place of Celebration: Zaragoza **Date:** June 1, 2015

Web: <http://artshumanities.netsci2015.net>

30. **Authors:** Garcia-Arenal, Fernando; Fraile, Aurora; Sacristán, Soledad; Valverde, Sergi

Title: Landscape heterogeneity, infection networks and plant virus emergence

Congress: 8th International Symbiosis Society (ISS) Congress

Place of Celebration: Lisboa **Date:** July 12-18, 2015

31. **Authors:** Valverde, Sergi

Title: Leyes Universales de los Ecosistemas Complejos

Congress: V Jornada UX / UOC #juxuoc

Place of Celebration: Sala Mobile World Capital, Barcelona **Date:** October 8, 2015.

Web: <http://mosaic.uoc.edu/jornadaux/>

32. **Authors:** Valverde, Sergi

Title: Mapping the Space of Programming Languages

Congress: Innovation as search on a landscape of possibilities

Place of Celebration: Santa Fe Institute, Santa Fe (NM) **Date:** October 15, 2015.

Web: <http://www.santafe.edu/gevent/detail/science/2024/>

Teaching experience

- 2015 - 2016 Bachelor's (Degree) Programme in Biomedical Engineering (UPF)
22106 - *Mathematical Biomodelling I*
22123 - *Evolutionary Algorithms*
22107 - *Introduction to the University and Biomedical Engineering*
22117 - *Principles of Biological Design*
- Bachelor's (Degree) Programme in Human Biology, University Pompeu Fabra
20332 - *Basic Sciences 1*
- Master's Degree in Bioinformatics, University of Valencia*
Introduction to Complex Networks: Patterns & Models (Invited Professor)
- 2014 - 2015 Bachelor's (Degree) Programme in Biomedical Engineering (UPF)
22106 - *Mathematical Biomodelling I*
22123 - *Evolutionary Algorithms*
22107 - *Introduction to the University and Biomedical Engineering*
22117 - *Principles of Biological Design*
- Bachelor's (Degree) Programme in Human Biology, University Pompeu Fabra
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Introduction to Complex Networks: Patterns & Models (Invited Professor)
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22106 - *Mathematical Biomodelling I*
22123 - *Evolutionary Algorithms*
22107 - *Introduction to the University and Biomedical Engineering*
22117 - *Principles of Biological Design*
- Bachelor's (Degree) Programme in Human Biology, University Pompeu Fabra
20332 - *Basic Sciences 1*
- 2012 - 2013 Bachelor's (Degree) Programme in Biomedical Engineering (UPF)
22106 - *Mathematical Biomodelling I*
22123 - *Evolutionary Algorithms*
22107 - *Introduction to the University and Biomedical Engineering*
22117 - *Principles of Biological Design*
- Bachelor's (Degree) Programme in Human Biology, University Pompeu Fabra
20332 - *Basic Sciences 1*
- 2011 - 2012 Bachelor's (Degree) Programme in Biomedical Engineering (UPF)
22107 - *Introduction to the University and Biomedical Engineering*
22117 - *Principles of Biological Design*
- Bachelor's (Degree) Programme in Human Biology, University Pompeu Fabra
20332 - *Basic Sciences 1*
- 2010 - 2011 Bachelor's (Degree) Programme in Human Biology, University Pompeu Fabra
20332 - *Basic Sciences 1*
- 2009 - 2010 Bachelor's (Degree) Programme in Human Biology, University Pompeu Fabra
20332 - *Basic Sciences 1*

2008 - 2009 Bachelor's (Degree) Programme in Human Biology, University Pompeu Fabra
20332 - *Basic Sciences 1*

PhD Thesis supervision

Title: Topological Complexity of the Electricity Transmission Network Implications in the Sustainability Paradigm

Doctorate: Rosas Casals, Martí

University: Universitat Politècnica de Catalunya

Date: 01/01/2009

Title: An Unified Approach to the Emergence of Complex Communication

Doctorate: Corominas Murtra, Bernat

University: Universitat Pompeu Fabra

Date: 01/01/2011

Participation on committees

Title: External evaluator for the European Project FOC (Forecasting Financial Crises)

Institution: European Union

Date: 01/01/2011-31/12/2012.

Title: Artificial Life. Program Committee of the 13th Artificial Life Conference

Institution: The International Society for Artificial Life

Date: 19/09/2012

Title: Artificial Life. Program Committee of the 14th Artificial Life Conference

Institution: The International Society for Artificial Life

Date: 30/07/2014

Title: ECAL 2015. Program Committee of the 13th European Conference on Artificial Life

Institution: The International Society for Artificial Life

Date: 20/07/2015

Title: Artificial Life. Program Committee of the 15th Artificial Life Conference

Institution: The International Society for Artificial Life

Date: 2016

Title: Member of the CSS Council

Institution: Complex Systems Society (CSS) <http://cssociety.org/about-us/council>

Date: 2016 - 2018

Event organization

Title: Workshop on Complexity in Energy Infrastructures: Models, Metrics, Metaphors (ECCS'11 Satellite Meeting)

Activity type: Organizer

Date: 15/09/2011

Title: Workshop on The Cultural Evolution of Technology: Evidence, Hypothesis and Theory (ECCS'15 Satellite Meeting)

Activity type: Organizer

Date: 30/09/2015

Website: <http://www.ccs2015.org/satellite-the-cultural-evolution-of-technology-evidence-hypothesis-and-theory/>

Software

Title: Red1 (El Periodico de Catalunya)

Company: Ediciones Primera Plana.

Description: Desktop publishing software used in the production of the newspaper 'El Periodico de Catalunya). Automatic machine translation used in the production of the catalan version of the newspaper.

Title: ProRally 2002

Company: Ubisoft Entertainment

Description: Racing videogame created by Ubisoft for the Playstation 2 and Nintendo Game Cube consoles.

Title: Chimera

Description: Simulation platform for “programmable life systems” that combines evolutionary dynamics with realistic physical embodiment. Our system offers to possibility to design new functions on top of a realistic computational model that takes into account emergent properties. This tool can be adapted to simulate micro-fluidics experiments and testing hypothesis of tumour growth and angiogenesis.

Title: Netlab

Description: Software for the analysis, modelling and visualisation of complex networks. This toolkit has been reused in many Complex Systems Lab publications during the last decade. Renderings produced with Netlab shave been featured in popular media like New York Times Magazine (March 12th, 2006) and a special Nature issue on Ecological Complexity (vol. 442 no. 7100, July 20th 2006): <http://www.nature.com/nature/journal/v442/n7100/edsumm/e060720-01.html>

Title: BiMat

Description: Open-source MATLAB library whose main function is the analysis of modularity and nestedness in bipartite ecological networks. BiMat has been developed in collaboration with Cesar Flores, Timothee Poisot and Joshua Weitz. Its main features include: modularity and nestedness calculation, diversity calculation using Shannon and Simpson's indexes, different null models for the creation of random bipartite networks, and statistics of the network. Please check the website: <http://bimat.github.io>