

## Curriculum vitae



**NAME:** VALVERDE, SERGI

**DATE:** 09.10.2015

**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](mailto: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 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 Industriale, 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 COMMUNICATING 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](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](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/lainnovacioncomounsistemacomplejoevoluciontecnologicayemergenciadelacreatividadcomputacional>

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/>

## **Teaching experience**

2014 (Master's Degree in Bioinformatics, University of Valencia)  
- *Introduction to Complex Networks: Patterns & Models* (Invited Professor)

2011 - 2015 (Degree in Biomedical Engineering, University Pompeu Fabra)  
22106 - *Biomodelat Matemàtic I*  
22107 - *Introducció a la Universitat i a l'Enginyeria Biomèdica*  
22117 - *Principis del Disseny Biològic*  
22123 - *Algoritmes Evolutius*

2009 - 2015 (Degree in Human Biology, University Pompeu Fabra)  
20332 - *Ciències Bàsiques 1: Simulació amb Netlogo*

## **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

## **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 have 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>