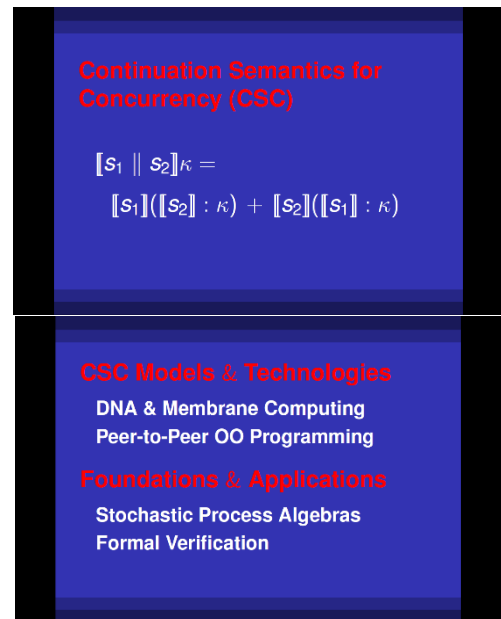


# FOUNDATIONS AND APPLICATIONS OF ADVANCED SOFTWARE TECHNOLOGY- RESEARCH GROUP

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## Areas of expertise

### Software Engineering:

- Formal Methods, Object-Oriented Methods

### Software Solutions for Smart City:

- eBusiness, eAdministration, eHealth, Medical Databases  
- Smart Traffic, Urban Traffic Image Processing

### Semantic Models and Technologies

- DNA Computing, Membrane Computing  
- Global Computing (GC), Image Processing in GC Context

## Team

**Prof. Dr. Eng. Eneia Nicolae Todoran**, Assoc.Prof.Dr. Paulina Mitrea, Eng. Dorin Simina

## Representative projects

**Next Generation Brained City**, “Innovative development through informatization of the Cluj-Napoca urban ecosystem” - POSCCE/Op.1.3.3, no. 13.C01.010, cod SMIS 49752 (2014-2015); sub-projects:

- **ProcessPlayer** , “Platform for the optimization of process flows for and between the public authorities”, collaboration with ARXIA SRL & UBB (Contract POSCCE No.1CLT/800.003/8/29.04.2014 / Subproject SP1)
- “Software services design for intelligent routing in urban road traffic in Smart City context” (Contract POSCCE No.1CLT/800.003/8/29.04.2014 / Subproject SF1)

**SemNat**, “Semantic models and technologies for natural computing” - CAPABILITIES, Module III, Greece-Romania bilateral collaboration project, no. 582/16.07.2012 (2012-2014)

**BETTY**, “Behavioral Types for Reliable Large-Scale Software Systems”, ICT COST Action IC1201, [http://www.cost.eu/domains\\_actions/ict/Actions/IC1201](http://www.cost.eu/domains_actions/ict/Actions/IC1201) Management Committee members for Romania: Prof.Dr. Gabriel Ciobanu, Prof.Dr. Eneia Nicolae Todoran (2012-2016)

**DFA@eInclusion**, “Design for All for e-inclusion”, FP7 project no. 033838, (2008-2010)

“Distributed System for Early Prevention, Monitoring and Treatment of the Cardio toxicity Induced by Chemotherapy and Radiotherapy in Oncologic Patients”, PNII/IDEAS Project no. 1340/2009; (2008-2010)

**GlobalComp**, “Models, semantics, logics and technologies for global computing”, ANCS, CNMP-PC, no. 11052/18.09.2007; (2007-2010).

## Significant results

### The most representative publications of the past 5 years:

1. E. N. Todoran and N. Papaspyrou, "Concurrency Semantics in Continuation-Passing Style," *Fundamenta Informaticae*, vol. 153, no. 1-2, pp. 125-146, 2017.
2. G. Ciobanu and E. N. Todoran, "Denotational semantics of membrane systems by using complete metric spaces," *Theoretical Computer Science*, vol. 701, pp. 85-108, Nov 2017.
3. G. Ciobanu and E. N. Todoran, "Continuation Passing Semantics for Membrane Systems," in *Membrane Computing*, vol. 10105, A. Leporati, G. Rozenberg, A. Salomaa, and C. Zandron, Eds. (Lecture Notes in Computer Science, Cham: Springer International Publishing Ag, 2017, pp. 165-176.
4. G. Ciobanu, E.N. Todoran, "Continuation Semantics for Concurrency with Multiple Channels Communication", *Proc. ICFEM 2015, Lecture Notes in Computer Science*, vol. 9407, pp. 400-416, 2015.
5. E.N. Todoran, P. Mitrea, "Semantic investigation of a control-flow subset of BPMN 2.0", *Proc. IEEE ICCP 2015*, pp. 483-490, 2015.
6. G. Ciobanu, E.N. Todoran, "Continuation Semantics for Asynchronous Concurrency", *Fundamenta Informaticae*, vol. 131(3-4), pp. 373-388, 2014.
7. I. Chifor, P. Mitrea, et al, "Mathematical methods for assessing the prognostic of fixed partial dentures resulting from evaluating a group of dental patients", *Computational and Mathematical Methods in Medicine*, vol. 2014, article ID 984901, <http://dx.doi.org/10.1155/2014/98490>, 2014.
8. S. Brad, P. Mitrea, "Functional and strategic aligned clusters towards more united economies and sustainable development", *Proc. European Cluster Days-Strasbourg 2014*, pp. 125-146, 2014.
9. A.I. Mitrea, S. Nedeveschi, D. Mitrea, P. Mitrea, "Diseased tissue are detection and delimitation by fusion between finite difference methods and textural analysis", *Proc. AQTR 2014*, pp. 1-5, 2014.
10. G. Ciobanu, E.N. Todoran, "Correct metric semantics for a biologically-inspired formalism", *Proc. IEEE SYNASC 2014*, pp. 317-324, 2014.
11. E.N. Todoran, N. Papaspyrou, "Experiments with continuation semantics for DNA computing", *Proc. IEEE ICCP 2013*, pp. 251-259, 2013.
12. Y. Rouselakis, N. Papaspyrou, Y. Tsiouris, E.N. Todoran, "Compilation to quantum circuits for a language with quantum data and control", *Proc. IEEE FedCSIS*, pp. , 1549-1556, 2013.
13. P. Mitrea, D. Homorodean, S. Brad, "The role of IT technology in ambient assisted living and the assiduous involment of EDeAN network in AAL", *Proc. AAATE 2013*, pp. 200-206, 2013.

### Significant solutions:

Continuation semantics for concurrency, Denotational semantics for models of natural (membrane, DNA) computing, Denotational semantics for multiparty interaction, Denotational semantics for models of global computing

### Products and technologies:

1. Prototype interpreter for mobile objects with multiparty interaction in peer to peer systems
2. Prototype interpreter for a control flow subset of BPMN 2.0
3. Prototypes for medical image processing in global computing context
4. Communication prototypes for smart sensor networks

## The offer addressed to the economic environment

Research & development	Formal design of reliable distributed software systems and programming languages
Consulting	Formal design of reliable distributed software systems and programming languages
Training	<p><b>Software Engineering:</b> software development paradigms. requirements engineering, UML class diagrams and OO analysis, modeling interaction and behavior, architecting and designing software, software testing techniques and strategies, PRISM probabilistic model checking</p> <p><b>Advanced Topics in Software Engineering and Programming Languages:</b> formal methods, denotational and operational semantics, stochastic process algebras, type systems</p>