

# Zinovy Diskin, PhD

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## SUMMARY

Extensive experience in computer science and mathematics in a variety of contexts:

- 15+ years of being a computer scientist working in an industrial environment,
- 15+ years of building mathematical models for concepts and artifacts in software engineering,
- 20 years of formulating the knowledge of the domain experts in abstract, explicit and precise terms, and making them into consistent and comprehensible specifications.

## SCIENTIFIC RESULTS

- Generic specification patterns for model management, heterogeneous data and schema transformation and integration, multimodeling
- Novel graphic specification language of *graphs with diagram predicates*. General guidelines for its applications in software engineering. Particularly,
  - Formal semantics for parts of UML and improvements to the UML's notational mechanism
  - Formal semantics for knowledge representation and ontology languages
  - Managing heterogeneity of diagrammatic modeling languages
- Formal semantics for the notion of object identity and on this base an abstract syntax for diagrammatic object-oriented modeling

## EDUCATION / DEGREES

- Dr. Math *University of Latvia* (Riga, Latvia) 1994
- Cand.Sci. (PhD) in Math. *Omsk State University* (Russia), 1992
- Postgraduate Studies *Riga Aviation University*, 1989-92
- MS in Math *University of Latvia*, Riga, 1985

## PUBLICATIONS

More than forty in edited books, professional journals and conference proceedings including Models/UML, Diagrams, ER and OOPSLA conferences and workshops. A list of publications is enclosed.

## PERSONAL

- US citizenship
- Fluent Russian

## REFERENCES

Available upon request

(industrial and academic)

## JOB HISTORY

- **Research Associate, July 2008 - present**  
**[Generative Software Development Lab](#), Electrical and Computer Engineering, *University of Waterloo, Canada***
  - Multimodeling and heterogeneous model synchronization,
  - Modeling updates and update reconciliation, view update problem
  - Feature modeling and FOSD
- **Research Associate, 2007 - June 2008**  
***Department of computer science, University of Toronto, Canada***
  - Generic patterns of model merging
  - Model management tool/framework based on EMF (Eclipse)
  - Scenario-based behavior modeling
- **Postdoctoral Fellow, 2005 - 2006**  
***School of Computing, Queen's University, Kingston, Canada***
  - International project on building a mathematically justified formal semantics for UML (funded by OCE, Ontario, IBM CAS, IBM Germany, Queen's University and TU Munich).
  - Methods for model analysis, consistency checking and validation.
  - Mathematical foundations and methods for MDD
- **Research Fellow, 2000 - 2004**  
***Software Development Factory, Ltd Riga, Latvia***
  - OO modeling and design with UML in company's projects.
  - Mathematical theory of model management (funded by the Latvian Council of Science).
- **Independent Consultant, 2000-2004**  
*Consulted **SIMX** (Hightstown, NJ), **Universal IT Consulting** (Utica, MI), **ZMarket** (Alameda, CA) on different issues in OO visual modeling and model management. Specifically, on heterogeneous data and schema integration, ontology engineering, database schema reengineering and normalization. Also, on adapting UML for companies' projects.*
- **Business analyst, 1998-2004**  
***Shulman and Kaufman, Inc Southfield, MI, USA***
  - Improving business organization and business process towards a better structure to satisfy new business needs.
  - Adapting the business to the information system (and conversely).
- **Head of Laboratory for Database Design, 1992-1997**  
***Frame Inform Systems, Ltd Riga, Latvia***
  - Led a project on developing a new methodology and software tools for business/enterprise modeling and database design.
  - Conceptual design of the banking system *The Wall* that has been successfully used in the banking software market.
- **Lecturer, part-time 1990-1995**  
***University of Latvia Riga, Latvia***
  - Developed and lectured courses in algebra, category theory and their applications to conceptual modeling and design.
- **Lecturer, part-time 1994-1995**  
***Imanta College of Education Riga, Latvia***
  - Courses "Principles of modern mathematics" and "The Universe of Mathematics" for school teachers of mathematics.
- **Engineer, 1985-1989**  
***Center for Carriage-Building Research and Development, Riga, Latvia***
  - Computing and analysis of strength/deformation fields for design of electric trains, including the high-speed ER-200.
  - Conceptual design of a database for these computations (input data and results).

## LIST OF PUBLICATIONS

### Contributions to Edited Books (EB):

- [2005a] Generic Model Management: Why, What and How, Mathematically (jointly with Boris Kadish). In *Encyclopedia of Database Technologies & Applications*, Eds. L. Rivero, J. Doorn and V. Ferragine, *Idea Publishing Group*, 2005 (ISBN: 1-59140-560-2) pp.258-265
- [2005b] Mathematics of generic specifications for model management, I and II. In *Encyclopedia of Database Technologies & Applications*, Eds. L. Rivero, J. Doorn and V. Ferragine, *Idea Publishing Group*, 2005 (ISBN: 1-59140-560-2) pp.266-366
- [2003a] Mathematics of UML: Making the Odysseys of UML less dramatic. Chapter 8 in *Practical foundations of business system specifications*, Eds. K. Baclawski and H. Kilov. **Kluwer Academic Publishers**, 2003 (ISBN 1-4020-1480-5) pp.145-178.
- [1999a] What vs. how of visual modeling: The arrow logic of graphic notations (with Boris Kadish and Frank Piessens). Chapter 3 in *Behavioral Specifications in Businesses and Systems*. Eds. H. Kilov, B. Rumpe and I. Simmonds. **Kluwer Academic Publishers**, 1999 (ISBN 0-7923-8629-9) pp. 27-44

### Journal Articles (JA):

- [2007] Package merge in UML 2: Practice vs. theory? (with Juergen Dingel and Alanna Zito). *J. of Software and System Modeling*. DOI 10.1007/s10270-007-0073-9
- [2003b] Variable set semantics for keyed generalized sketches: Formal semantics for object identity and abstract syntax for conceptual modeling (with Boris Kadish). *Data and Knowledge Engineering*, 47 (2003), pp.1-59
- [1999b] Humans, Computers, Specifications: The Arrow Logic of Information System Engineering (with B. Kadish and F. Piessens). *Int. J. of Computing Anticipatory Systems*, 4:31-51, 1999 (ISBN 2-9600179-4-3), pp.31-51
- [1996a] Abstract universal algebraic logic, I: A unified framework of structural hyperlogics for integrating the deductive and model-theoretical approaches. *Proc. Latvian Acad. Sci.*, 50(1): 10-21, 1996
- [1996b] Abstract universal algebraic logic, II: Algebraizable logics and algebraic semantics (Galois connections, compactness, and constructivity). *Proc. Latvian Acad. Sci.*, 50(1): 22-30, 1996
- [1994] When is semantically defined logic algebraizable? *Acta Universitatis Latviensis*, vol.595: 57-82, 1994

### Conference Proceedings (CP):

- [2008a] Algebraic Models for Bidirectional Model Synchronization. In *ACM/IEEE 11th Int. Conf. on Model Driven Engineering Languages and Systems (MODELS'08)*. Toulouse, France. October 2008 Springer LNCS, Vol. 5301, 2008
- [2008b] A General Approach for Scenario Integration (with Hongzhi Liang, Juergen Dingel and Ernesto Posse). In *ACM/IEEE 11th Int. Conf. on Model Driven Engineering Languages and Systems (MODELS'08)*. Toulouse, France. October 2008 Springer LNCS, Vol. 5301, 2008
- [2008c] Engineering associations: from models to code and back through semantics (with Steve Easterbrook and Juergen Dingel). In *46th Int. Conf. on Objects, Models, Components, Patterns (TOOLS '08)*. Springer LNBIP, Vol. 11, 2008

- [2008d] A Diagrammatic Logic for Object-Oriented Visual Modeling (with Uwe Wolter). To appear in *ENTCS (Special Issue on the Applied & Computational Category Theory Workshop at ETAPS-2006)*. Accepted for publication in June 2008
- [2008e] Contexts and Context Awareness in the Diagram Predicate Logic Framework (with Uwe Wolter). In *3rd Int.Symposium on Leveraging Applications of Formal Methods, Verification and Validation*. Kassandra, Greece. October 2008 Springer CCIS Vol.17
- [2006a] Mappings, maps and tables: Towards formal semantics for associations in UML2 (with Juergen Dingel). In Proc. **ACM/IEEE 9th Int. Conference on Model Driven Engineering Languages and Systems, Models/UML-2006**. Eds. O. Nierstrasz, J. Whittle, D. Harel, G. Reggio. Springer, LNCS #4199, 2006
- [2006b] Package merge in UML 2: Practice vs. theory? (with Alanna Zito and Juergen Dingel) In Proc. **ACM/IEEE 9th Int. Conference on Model Driven Engineering Languages and Systems, Models/UML-2006**. Eds. O. Nierstrasz, J. Whittle, D. Harel, G. Reggio. Springer, LNCS #4199, 2006
- [2002] Visualization vs. specification in diagrammatic notations: a case study with the UML. Extended abstract. In *Diagrammatic Representation and Inference. 2<sup>nd</sup> Int. Conf. on the theory and applications of diagrams, Diagrams'2002*. Eds. M. Hegarty, B. Meyer, N. Hari Narayanan. Springer LNAI #2317, 2002, pp. 112-115.
- [2000a] Universal arrow foundations for visual modeling (together with Boris Kadish, Frank Piessens and Michael Johnson). In *Diagrammatic Representation and Inference: 1<sup>st</sup> Int.Conf. on the Theory and Applications of Diagrams, Diagrams'2000* Eds. M.Anderson, P.Cheng and V.Haarslev, Springer LNAI #1889, pp.345-360
- [2000b] On mathematical foundations for business modeling. In *TOOLS'37: 37<sup>th</sup> Int. Conference on Technology of Object-Oriented Languages and Systems*, Sydney, Australia, October 2000. IEEE Computer Society Press, 2000, pp. 182-187
- [1998a] The Arrow Manifesto: Towards software engineering based on comprehensible yet rigorous graphical specifications (with B. Kadish and F. Piessens). In *15th Int. Congress for Cybernetics*, Namur, Belgium, August 1998
- [1997a] Towards algebraic graph-based model theory for computer science. In: *Logic Colloquium'95*. Abstract is published in *Bull. Symbolic Logic*, 3 (1):44-145, 1997
- [1997b] Formalization of graphical schemas: General sketch-based logic vs. heuristic pictures. In *Logic, Methodology and Philosophy of Science*. Proc. **10<sup>th</sup> Int. Congress**, Florence, Italy, 1995. Kluwer Acad. Publishers,
- [1997c] A graphical yet formalized framework for specifying view systems (with B. Kadish). In *Advances in databases and information systems, ADBIS'97*, Proc. **1<sup>st</sup> East-European Symposium**,. St. Petersburg,Russia, September 1997. Volume 1: Regular Papers. Nevsky Dialect, 1997, pp.123-132
- [1996c] Heterogeneous view integration via sketches and equations (with B. Cadish). In *Foundations of Intelligent Systems, ISMIS'96*. Proc. **9<sup>th</sup> Int. Symposium**, Springer Lecture Notes in AI, #1079:603-612, 1996
- [1995a] Variable sets and function framework for conceptual modeling: Integrating ER and OO via sketches with dynamic markers (with B. Cadish). In *Object-Oriented and Entity-Relationship Modeling, OOE'95*. Proc. **14th Int.Conference**, Springer Lect.Notes in Comp.Sci., #1021,1995, pp.226-237

- [1993a] Lambda substitution algebras (with Ilya Beylin). In *Mathematical Foundations of Computer Science, MFCS'93*. Proc. **18<sup>th</sup> Int. Symposium**. Springer Lecture Notes in Comp. Sci., #711, 1993, pp.423-433

### **Workshop Proceedings (referred, WP):**

- [2007a] An Eclipse-based tool framework for software model management (with Rick Salay, Marsha Chechik, Steve Easterbrook, Pete McCormick, Shiva Nejati, Mehrdad Sabetzadeh and Petcharat Viriyakattiyaporn). In *OOPSLA Workshop on Eclipse Technology eXchange, [ETX'2007](#) (Montreal, Canada). 2007*
- [2006c] A metamodel independent framework for model transformation: Towards generic model management patterns in reverse engineering (with Juergen Dingel). In: *3rd Int. Workshop on Metamodels, Schemas, Grammars and Ontologies for reverse engineering, ATEM-2006 (affiliated with Models-2006)*. Eds. J-M. Favre, D. Gasevic, R. Laemmel, A. Winter, 2006
- [2001] On modeling, mathematics, category theory and RM-ODP. In *WOODPECKER'2001: 1<sup>st</sup> Int. Workshop On Open Distributed Processing: Enterprise, Computation, Knowledge, Engineering and Realization (in conjunction with ICEIS'2001)*. Setubal, Portugal, June 2001. ICEIS Press, Portugal, 2001 (ISBN 972-98050-5-9), pp.38-54.
- [1999c] Abstract Metamodeling, I: How to reason about meta- and metamodeling in a formal way. In *8<sup>th</sup> OOPSLA Workshop on Behavioral Semantics of OO Business and System Specifications*, Eds. Ken Baclawski et al, College of Computer Science, Northeastern University, 1999, pp. 32-48
- [1998b] The arrow logic of meta-specifications: a formalized graph-based framework for structuring schema repositories. In *7<sup>th</sup> OOPSLA Workshop on Behavioral Semantics of OO Business and System Specifications*, Eds. Haim Kilov, Bernhard Rumpe and Ian Simmonds, 1998
- [1998c] A unified functorial framework for prepositional-like and equational-like logics. In *1<sup>st</sup> Int. Workshop on Abstract Algebraic Logic, WAAL'97, Centre de Recerca Matematica, Barcelona, Spain, 1997. Quaderns*, 10:26-50, 1998
- [1995b] Algebraic graph-based approach to management of multibase systems, I: Schema integration via sketches and equations (with B. Cadish). In *Next Generation of Information Technologies and Systems, NGITS'95*. Proc. **2nd Int. Workshop**, Naharia, Israel, July 1995. Eds. Ami Motro and Moshe Tennenholtz. pp.69-79