

Curriculum Vitae for Flemming Nielson (Nov. 2008)

Education. Flemming Nielson holds an *MSc (cand.scient.)* in Mathematics and Computer Science from Aarhus University (1981), a *PhD* in Computer Science from Edinburgh University (1984) including a stay at MIT, and he was the first to be awarded a *DSc (dr.scient.)* in Computer Science from Aarhus University (1990).

Employment. He has been *associate professor* at the universities in Aalborg and Aarhus, *visiting professor* at the universities in Kiel and Saarbrücken and at the Max Planck Institute in Saarbrücken, and is currently *full professor* at DTU.



Research Impact. He is the co-author of **5** books and the editor of **1**; the Trier-database (dblp, November 2007) lists **100** publications including **35** journal papers (the longest of which was published as a special issue of the prestigious TCS Fundamental Studies); Citeseer (August 2006) lists him in position 1227 (of the most cited Computer Scientists worldwide) with 1267 citations; his H-index (according to Harzing's publish or perish, November 2007) is **27**.

National Research Leadership. He was the coordinator of the research project *Design, Analysis and Reasoning about Tools* that for several years involved researchers at Aarhus, Aalborg and Copenhagen Universities. Since then he has been principal investigator of many other national research projects. He is currently the principal investigator of the projects *Security in Embedded Systems* and *Aspects of Security for Citizens* funded by the Danish Strategic Research Council. Furthermore, he serves on the board of the Graduate School *FIRST* involving ITU and DTU. He is director of the newly established Villum Kahn Rasmussen Centre of Excellence called *MT-LAB – Modelling of information Technology*.

European Research Leadership. He was the coordinator of the EU project LOMAPS on *Logical and Operational Methods in the Analysis of Programs and Systems* involving partners at Aarhus, Cambridge, and ENS in Paris (completed 1997). Since then he has been site leader of several EU projects including the SecSafe project on *Secure and Safe Systems based on Program Analysis* (completed 2003) and the DEGAS project on *Design Environments for Global ApplicationS* (completed 2005). He is currently site leader and leader of the work package on qualitative analysis techniques in the EU Integrated Project SENSORIA on *Software Engineering for Service-Oriented Overlay Computers*.

Administrative Leadership. He has been **Head of Division** for Computer Science and Engineering at DTU during 2002-2006 (being head of up to 50 members of staff, including about 30 assistant, associate or full professors) and has passed the Departmental Management Course initiated by the Danish Rectors' Conference. Additionally he has taken courses on effective university teaching, coaching, and supervision of PhD-students and assistant professors.

Teaching Experience. He has taught courses on a variety of topics at the BSc-, MSc- and PhD-level: Automata Theory, Principles of Programming Languages, Semantics, Principles of Program Analysis, Abstract Interpretation, Program Transformations, Functional Languages, Safety and Security of Systems, and Stochastic Models and Logics. He has also taught several international PhD-courses on Operational Semantics, Principles of Program Analysis, Foundations on Security Analysis and Design, and Analysis Methods for Global Computing.

Supervision Experience. He has supervised students at the BSc-, MSc- and PhD-levels and has served as an external examiner at the MSc- and PhD-levels. He is currently supervising the PhD-students Nataliya Skrypnyuk, Fan Yang and Ye Zhang and is co-supervising the PhD-students Christoffer Rosenkilde Nielsen and Ender Yüksel.

Research Interests. His research interests can be grouped into three phases.

- *Abstract Interpretation and Denotational Semantics* (circa 1980-1991). As a PhD-student and subsequently his research focused on the interplay between denotational semantics and abstract interpretation (which is a powerful technique for static analysis). His work also touched upon the correctness of code generation and several types of program transformations (including binding time analyses). His DSc (dr.scient.) was based on this work, and some of the main findings were summarised in a monograph.
- *Type and Effect Systems for Concurrency* (circa 1990-1998). In response to the need to deal with more challenging features of programming languages, in particular concurrency as in Concurrent ML, he changed his approach from denotational semantics to structural operational semantics and from abstract interpretation to type and effect systems. This work pioneered the formal construction of process algebra expressions summarising the behaviour of programs as studied in the EU project LOMAPS. Some of the main findings were summarised in a monograph.
- *Flow Logic* (since 1997). In order to reconcile the nice structured approach of type systems, distinguishing between specification and implementation, with the vast body of techniques in more classical static analysis, he initiated the approach of Flow Logic. The early stages demonstrated the ease with which different programming paradigms could be treated and the ability to transfer methods and insights from one paradigm to another. The later stages pioneered the development of static analysis for process algebras, usually with applications to security in mind, in particular establishing the correctness of cryptographic communication protocols.

Presently a fourth phase is starting:

- *Quantitative and Qualitative Modelling and Analysis.* This is a key topic of the VKR centre of Excellence MT-LAB and also touches upon activities of the EU project SENSORIA. A main, and as yet unsolved challenge, is the integration of qualitative and quantitative modelling and analysis techniques combining approaches from static analysis and model checking.