


## HAW Hamburg

Name of the organisation :	HAW Hamburg	
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Name of the contact person :	Ivo Nowak	
Function:	Researcher	
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### Type of organisation:

SME  School  University  Public Authority   
Training  No Profit  NGO

Other (Specify)

### Fields of action :

SMEs  Youth  Universities  Public Authorities   
Equal opportunities  Schools  Unemployed

Other (Specify)

### Description of the organisation

The Hamburg University of Applied Sciences (German: Hochschule für Angewandte Wissenschaften Hamburg) is a higher education and applied research institution located in Hamburg. In terms of student enrolment, the HAW is the second-largest university in Hamburg and the third-largest applied sciences university in Germany, with a student body of 17,100

### Experience of the organization in previous European projects

Currently EU-funded project at HAW-Hamburg: <https://bioplasticseurope.eu/>

### Experience and Expertise of the organization in the project's subject area

There is the following ongoing project at the HAW Hamburg (Prof. Landenfels):

viaMINT is an online learning platform for bridging courses developed and nearly completed by Hamburg University of Applied Sciences (HAW) and funded by the Bundesministerium für Bildung und Forschung BMBF (Federal Ministry of Education and Research). In viaMINT first-year students can find different bridging courses on one common learning platform. The mathematics bridging course has been available for several semesters. The physics course is still being developed.

viaMINT has a video oriented approach with supplemental exercises. It includes numerous examples, animations and interactive applets that serve as visualizations. Supplement material such as the formula sheet are included to support the sustained learning. Students using viaMINT work in a personalised learning environment, the "Persönlicher Online-Schreibtisch" (Personal Online Desk). The Personal Online Desk supports organised study by visually indicating the study recommendations on the basis of an entrance test as well as the corresponding learning progress.

Fitting the specific needs of each individual student, viaMINT offers different learning opportunities e.g. a "Detailed Learning Track" and a "Short Learning Track". As further supplement, custom-fit courses with on-site attendance are held at the Hamburg University of Applied Sciences. viaMINT is available in German. An English translation is in progress. A distinction for different degree programmes is scheduled. A more detailed description of viaMINT is available in Landenfeld et al. (2014) and Landenfeld et al. (2016). See [viamint.haw-hamburg.de](http://viamint.haw-hamburg.de).

There are several AI projects at the HAW Hamburg:

The contact person, Ivo Nowak, and Eligius Hendrix are working currently in the following machine learning projects:

1. <https://www.math.uni-hamburg.de/home/iske/soda.en.html>
2. DADLN "Dynamics and adaptive decomposition of machine learning networks", (2020-2023, BMBF)

Further related project (Prof. Baumgart):

CoKoMo - A Model for Conceptual Knowledge in Client-Server-Applications - CoKoMo

<https://www.haw-hamburg.de/forschung/projekte-a-z/forschungsprojekte-detail/project/project/show/cokomo/>

### Contributions that can be provided to the project

1. Development and application of machine learning methods (with Eligius Hendrix)
2. Cooperation with the viaMINT project (online learning platform, see above, with Karin Landenfels)
3. Cooperation with the CoKoMo project (with Andreas Baumgart)

### Reasons of involvement in the project

I am teaching math and I am interesting in applications and development of machine learning methods.

### Contact Person's Experience and Expertise

**Prof. Dr. habil. Ivo Nowak**

W2-Professor for Optimization, Mathematics and Computer Science at HAW Hamburg

Web: <http://www.haw-hamburg.de/ti-mp/user-department/beschaefigte/name/ivo-nowak.html>

**Education**

2004 Dr. rer. nat. habil., Mathematics, Humboldt-Universität zu Berlin (Römisch, Sahinidis, Grossmann, Helmberg)  
1994 Dr. rer. nat., Mathematics, Technische Universität Berlin (Pinkall)  
1988 Diplom, Mathematics, Technische Universität Darmstadt (Spellucci)

**Experience**

since 2014 Professor (W2) at HAW Hamburg  
2004 - 2014 Product Manager, Lufthansa Systems Berlin  
2004 Researcher, Konrad-Zuse-Institut-Berlin  
1998 - 2004 Associate Professor (C1), Humboldt-Universität zu Berlin  
1994 - 1998 Research Assistant, Technische Universität Cottbus  
1989 - 1994 PhD, Technische Universität Berlin

**Activities in the scientific community**

since 2014 Referee for Mathematical Programming, Journal of Global Optimization, Operations Research and Decisions, European Journal of Operational Research

**Research interests**

- Large-scale global optimization
- Machine learning
- Planning and control
- Engineering design

**Mentoring of PhD students in the last 5 years**

P. Muts, 2021, HAW Hamburg, Decomposition Methods for MINLP

**Selected publications**

1. P. Muts, S. Bruche, I. Nowak, O. Wu, E. Hendrix, G. Tsatsaronis, A Column Generation Algorithm for Solving Energy System Planning Problems, submitted to Optimization and Engineering, 2020
2. P. Muts, I. Nowak, Eligius M.T. Hendrix, On decomposition and multiobjective-based column and disjunctive cut generation for MINLP, Optimization and Engineering, [link.springer.com/article/10.1007/s11081-020-09576-x](https://link.springer.com/article/10.1007/s11081-020-09576-x), 2020
3. P. Muts, I. Nowak, Eligius M.T. Hendrix, The Decomposition-based Outer Approximation Algorithm for Convex Mixed-Integer Nonlinear Programming, Journal of Global Optimization, [doi.org/10.1007/s10898-020-00888-x](https://doi.org/10.1007/s10898-020-00888-x), 2020
4. I. Nowak, N. Breitfeld, E. M. T. Hendrix, G. Njacheun-Njanzoua, (2018). Decomposition-based Inner- and Outer-Refinement Algorithms for Global Optimization, J. Glob. Opt.
5. T. Ahadi-Oskui, S. Vigerske, I. Nowak, G. Tsatsaronis, (2010). Optimizing the design of complex energy conversion systems by Branch and Cut, Comp. & Chem. Eng. 34(8), 1226–1236
6. I. Nowak and S. Vigerske, (2008). LaGO - a (heuristic) Branch and Cut algorithm for nonconvex MINLPs, Central European Journal of Operations Research 16(2), 127–138
7. I. Nowak and S. Vigerske, (2007). Adaptive discretization of convex multistage stochastic programs, Mathematical Methods of Operations Research, 65(2), 361–383.
8. I. Nowak, (2005). Relaxation and Decomposition Methods for Mixed Integer Nonlinear Programming, Basel, International Series of Numerical Mathematics, Vol. 152, XVI, 213 p.
9. I. Nowak, (2004). Lagrangian Decomposition of Block-Separable Mixed-Integer All-Quadratic Programs, Mathematical Programming
10. I. Nowak, (1997). Numerical Finiteness Results for Minimal Surfaces in M3(c), Experimental Mathematics, 6(4), 301–315.