

Matthias Peter Nowak (CV)

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Key skills

“Making it work” might be my greatest skill. As a mathematician, I’m trained in systematic thinking—piecing together parts to form a coherent, functioning whole. This mindset is essential when writing thorough tests or debugging complex issues. I like to call it *systematic, relentless debugging*. For example, I’ve contributed bug fixes to open-source projects such as the VLC media player, the OpenStreetMap editor JOSM, and the Eclipse E4 project.

I often work in interdisciplinary teams, where colleagues bring domain expertise and I contribute mathematical and programming skills to achieve the desired results. Over the years, I have been involved in a wide range of fields, as reflected in my list of publications. My ability to quickly grasp new topics has led to responsibilities such as correcting SSIS flow components, leading the VNF project, developing Ansible scripts, and conducting testing. At Helseplattformen, I served as a senior member of the development team and acted as tech lead for simplifying the overall solution.

In my spare time, I use the source-based Linux distribution Gentoo, which often requires manual configuration and fine-tuning. The in-depth Linux knowledge I have gained from this has proven valuable in tasks involving Docker and system-level troubleshooting.

Being a team player means balancing focused individual work—such as implementing new features or investigating complex issues—with collaborative sessions, where better solutions are developed through idea exchange and discussion with colleagues. Students and co-workers have often asked for advice and support, and many consider me the approachable go-to person on the team.

Work experience

Worked for two months at Equinor, performing manual testing of 3D models on mobile devices and exploring the potential of automated testing using Playwright. Also contributed to the release process and provided general support to the development team.

At Helseplattformen, I worked in the Datamigrering Trondheim team, responsible for migrating clinical data from legacy systems into the new platform during GoLive weekends (twice yearly, named PD and KI). The original solution involved two ETL steps and a database based on the HL7 FHIR standard. Data transfer into Helseplattformen was performed using the HL7 v2.5 minimum lower layer protocol, which became my responsibility.

I resolved a critical bug in the original solution, leading to a smooth and reliable transfer during PD-2. To improve performance, I optimized the tool using parallel programming and asynchronous data transfer. I also took over responsibility for converting binary documents, refactoring that process into a separate program.

I contributed key components for the second-generation migration system, which was adopted in PD-3 and used for full data migration in KI-1. KI-1 was a major success, with extraction, transformation, and loading completed faster than estimated.

In 2024, I designed the “Simple Migrate” scheme, first used in KI-2. I developed the key tools for this solution, which eliminates the need for SSIS components and provides a fast, maintainable framework that simplifies creating scripts for new legacy systems.

At Gintel AS, I began by developing automated tests for the call-handling application based on the SIP protocol. The final testing framework was implemented using *docker compose* to simulate multiple system components, including MariaDB, Tomcat, the provisioning system, and the call-handling application itself. This framework evolved into an automated regression testing tool integrated with Gerrit.

The tests successfully identified several bugs, allowing Gintel to address them before delivering the software to Client 1. When the client commissioned the system, the number of incident reports did not increase – the solution simply worked as specified and expected.

During my time working on the project for Client 1, Gintel experienced two major crises. The first involved a severe memory leak that disrupted the client’s business operations. Through systematic and persistent debugging – despite working with unfamiliar source code – I was able to identify and help fix the issue. Valuable input from colleagues helped accelerate the process.

The second crisis involved a loss of business-critical data. Thanks to the test scripts I had previously developed, we were able to reconstruct the lost data from log files. In addition to these efforts, I was tasked with developing various scripts for other services, including both shell and Python scripts. My main contributions to the project were testing the system, debugging errors, and ensuring the overall solution functioned reliably.

The fifth generation of telecommunications (5G) includes a major shift from dedicated hardware to virtualized software components, known as VNFs (Virtualized Network Functions). At Gintel, I was responsible for setting up the Nokia product “CloudBand Application Manager” (CBAM). This required installing an OpenStack environment and developing all necessary automation scripts.

The goal was to fully automate the lifecycle – from provisioning virtual machines and installing software, to configuring and commissioning services. To demonstrate this approach to Client 2, we showcased a dynamically scaling and self-healing MariaDB Galera cluster with MaxScale load balancers. However, due to compatibility issues with the existing security infrastructure (e.g., NetScaler), the VNF approach could not be adopted in production. A static setup with a fixed set of virtual machines was used as an alternative.

The Nokia VNF solution utilizes Ansible as the deployment and configuration framework. Drawing on my experience from the CBAM-VNF project, I was tasked with writing deployment scripts for all Gintel components for Client 2. This included configuring Nginx, Tomcat, Wildfly, Telscale, and all of Gintel’s applications.

Finally, I integrated the RestComm-JDiameter software (an open-source but largely abandoned project) into Gintel’s call-handling application. This involved reviewing the source code in detail, as the documentation was lacking many crucial details.

In the SmartMaritime project at MARINTEK, I developed the Gymir platform, a workbench designed for conducting virtual sea trials. The platform utilized the Eclipse Rich Client Platform (e4), NetCDF libraries for weather data processing, the p2 mechanism for plugin management and updates, JNI for integrating functions from other programming languages, and Draw2D and SWT for graphical elements. My development tools included Maven, Tycho, and Git, and I also gained experience with remote debugging.

At NTNU, I conducted research at the intersection of simulation and optimization, developing an infrastructure investment model. Additionally, I supported several PhD students by advising on algorithms and co-authoring papers with them.

At SINTEF, I reverse-engineered a mathematical model from C++ source code for the SARA project. Over the years, I provided customer support, delivering bug fixes and implementing both mathematical and computational features. The model was eventually reimplemented using a high-level modeling language. To optimize computational efficiency, I developed a calculation queuing system as a *Windows service*, which was successfully used by Statoil for over 8 years.

Since 2000, I have developed tools for various applications and domains, as reflected in my literature list. One of my strengths is the ability to quickly gain the necessary knowledge and understanding to begin building decision support tools. I am pragmatic in my approach, with a focus on long-term solutions and reusability.

Knowledge and experiences

- studied mathematics: Optimization (linear, non-linear, discrete), Numerical mathematics, Stochastics and statistics, development, implementation, and analysis of algorithms.
- programmed in over 60 programming languages including procedural (C), object oriented (C#, Java, and TypeScript), functional (Lisp), logical (Prolog), literate (TeX), mathematical (Maple, Matlab, Octave), statistical (R) several XML-applications, modelling (Mosel), simulation (ModL), configuration (Oasis, Ansible, Salt), and database (PL/SQL, T-SQL, MariaDB, MS-SQL)
- Testing and debugging, wireshark traces, remote testing on virtual machines, implementation of automated tests, writing *Playwright* test script for *FrontEnd*
- Virtualization: Virtualbox, Hyper-V, Xen, Kvm, libvirt, OpenStack, CBAM, VNF
- Provisioning tools: Salt, Ansible
- Visual Studio (up to 2022): GUI, database, implementation of algorithms, linking with other software
- Java, Eclipse, IntelliJ, and Netbeans, Eclipse Rich Client Platform 4 (RCP e4), container based (Metaswitch Rhino and Telscale)
- building tools like maven, tycho, git, Atlassian suite, make, CMake
- active user of Linux since kernel version 0.99, distributions: slackware, Suse, Redhat, and Gentoo (intimate knowledge)
- simulation (ExtendSim, SSJ), discrete event simulation, including building a small system for agent based simulation
- administration of it-systems, 1992-1999 Administration of HP-UX and SUN systems, was responsible for installation and maintenance of GNU-software at the department Numerical Analysis at the university (Humboldt university Berlin, Germany)
- operating systems, familiar with Unix (HP-UX, AIX, SUNOS) and Windows (95 – Window 10)
- 2006-2008, was responsible for development of software for the parallel computing cluster at the department (Indøk, NTNU)
- Databases, Oracle (before 2006), MS-SQL, MySql, Mariadb, Sqlite
- Office including MS Access, in depth knowledge of Excel
- LaTeX publishing
- Russian radar station (1RL134) with chassis-mounted electronics, searched for hardware faults and did some repairs
- knowledge from interdisciplinary work, a short list:
 - Servlet container technologies: Tomcat, Wildfly, Telscale (Jboss based),

- Metaswitch Rhino
- Application containers: docker, VNF, OpenStack
- Protocols: SIP, Diameter, Camel, HTTP, HL7-mllp
- Gas transport, transient gas flow, investment and operational planning, compressor models
- LNG: design optimization of a liquefaction plant
- Use of the MARINTEK hydrodynamic calculation plugin (similar to ShipX)
- Use of weather hindsight and forecasting data in NetCDF format

Professional career

- mai 2022 – august 2025: Senior systems developer at Centric IT Solutions AS
- jan. 2019 – april 2022 : Systems developer at Gintel AS
- oct. 2008 – may 2017 : Senior scientist at MARINTEK (now SINTEF Ocean)
- oct. 2006 – sept. 2008 : Post-doc position at NTNU, industrial economy department (IndØk)
- jan. 2000 – sept. 2006 : Research scientist at SINTEF
- aug. – dec. 1999 : Scientific assistant at University Duisburg, FB 11 Mathematics
- 1987 – 1989 : Commanding a radar station during military service

Education

- 2006 – 2008: 2 years as post-doc at NTNU
- 1996 – 1999: Doctoral studies at Humboldt University of Berlin (Germany), completed in 2001 with the degree *Doctor rerum naturalium* (Doctor of Natural Sciences), awarded *magna cum laude*. Dissertation: *Stochastic Lagrangian Relaxation in Power Scheduling of a Hydro-Thermal System Under Uncertainty*.
- 1989 – 1996: Study of mathematics at Humboldt-University with physics as a minor subject. Diplom february 1996.
- 1986 – 1987: military school - sergeant
- 1984 – 1986: Secondary extended school at “Spezialschule für Mathematik und Physik” (elite school for mathematics and physics) at Humboldt-University
- 1974 – 1984: primary school, Polytechnische Oberschule II in Neubrandenburg

Extracurricular activities

- race officer and board member at Trondjems seilforening (2006 & 2007), organizing sail races and development of a web based system for registration using PHP, Ajax, and MySQL
- national certified judge in sailing 2010 - 2019
- elected accountant (revisor) of Trøndelags seilkrets, 2013
- board member of the Norwegian Operation Research Society 2013-2015, established the society in 2015 (paper work), wrote the bylaws, worked as the secretary, administered the web page until 2015.

Languages

- german – native
- english – fluent
- norwegian – fluent in bokmål, reading and listening nynorsk
- swedish – reading and listening skills

Certificates

- ISTQB Certified Tester Foundation Level, Credential ID 292780144
- Drivers license, class C1E (norwegian)
- Maritime VHF license
- Deck officer leisure boats D5LA (fritidsbåtskippersertifikat)

Personal

I enjoy cycling and have completed several long-distance tours, including Trelleborg to Siljan (1994), Trondheim to Finnsnes (2002), and the *Styrkeprøven* race in 2003. While not a skilled skier (I am terrible), I still enjoy cross-country skiing and participated in the *Birkebeinerrennet* in 2003.

Sailing, however, is my greatest passion. I previously owned an Yngling and have sailed extensively as crew on various boats. My experience includes coastal sailing from Bergen to Trondheim, a North Sea crossing in a 40-foot yacht during a moderate gale (Beaufort 7), and crossing the Bay of Biscay in a 38-foot catamaran. I also took part in the *Tall Ships Race* aboard *Christian Radich*, competed twice in the *Færderseilas*, and have organized and judged several sailing competitions.

Although my formal background is in mathematics, I have a strong practical orientation and a deep interest in technical subjects. During my military service, I worked with a Russian-built radar station, which challenged my understanding with its unconventional design. I'm drawn to creative solutions – my own boat, for example, featured a homemade mechanical autopilot without a wind rudder.

As a student, I explored low-level programming on Z80 systems and under DR-DOS. Over time, tinkering with Linux – including kernel module programming – has become a personal hobby. Due to both sailing and professional projects, I've developed a keen interest in maps, projections, and geospatial data.

Participation in the following projects

Optimale Lastverteilung mit unvollständiger Information unter Echtzeit-Bedingungen (Online power scheduling under uncertainty), 1995-1999;

Developed an algorithm for optimizing hydro power scheduling that achieved a 100-fold speed improvement over standard methods (Master's thesis). Combined this algorithm with dynamic programming and a bundle method, and designed a tailored heuristic. The resulting software was capable of solving the stochastic unit commitment problem with 100 scenarios for the East German hydro-thermal power system in under five minutes.

Open Market Energy Generation Allocation – OMEGA, 2000 - 2003

Participated in the development of an integrated decision support system for operational planning in utilities. While the project covered the entire system, my primary responsibility was the implementation of the scenario forecasting component, including modeling and integration with C++, Oracle, and DCOM.

Forecasting (Gilde), 2000-2002 Development of a prototype for forecasting. Programming Excel, VC++-dll and Xpress/MP.

Hydro Aluminium extrusion, 2001 Programming of a job shop calculation module in C++ as part of an overall resource planning optimization

Venoga, 2001-2004 Conducted research on transient gas flow as an extension to existing steady-state optimization models. This included flow simulation and the development of a linear approximation of transient behavior for integration into an

optimization framework. Additionally, developed a concave approximation model for compressor behavior in a complex gas network system.

SARA, 2002-2003 (responsible) Took over an existing investment planning tool along with its C++ source code. Reverse-engineered the software to extract the underlying mathematical model, implemented a new reservoir model, and upgraded the software to support extended functionality.

Resny, 2004 Integrated the Xpress/MP optimization software into an ERP system. Responsible for modeling QUID (Quantitative Ingredient Declaration) constraints and formulating the blending problem for recipe optimization.

NorgesPanda, 2004 Data manipulation using PL/SQL.

Analysis of norwegian fishing economy, 2003 - 2004 basic economic calculations using Leontiff-model, implementation of the calculation in VBA.

Maintenance SARA model, Oljedirektoratet, 2004 - 2008 general user support during the preparation for the license rounds

Visualisation of Material plans, NSB 2004(Project leader) Supervision of a student, implementation of Active-X components for visualisation of material plans - the line diagrams.

IT-based material planning for NSB, 2004 - 2006: Building the optimization model, implementing user interface and visualization. Worked most of the time in a scrum-like manner with frequent meetings with the end user.

Impact analysis of EU penalty taxes on Norwegian salmon, 2005. Extension of the Leontiff economical model with respect to several economical regions. Implementation, data manipulation and calculation.

SARA-III, 2005 - 2006 Part of the SING-project at Statoil. Translated the existing as-is model into a higher-level modeling language and extended it to support company portfolio analysis and rich gas processing.

Optimization Queue System, 2006 Part of the SING-project at Statoil. Implemented a queueing system for Xpress/MP calculations as a Windows service. The system was actively used by Statoil until 2014.

Optop, 2006 - 2008 Worked on the optimal configuration of a liquefaction plant using the HYSYS simulation software combined with custom optimization routines implemented in VBA. Co-authored a research publication and supervised two PhD students throughout the project.

NorWays, 2006 - 2008 Contributed to a project focused on introducing hydrogen into the Norwegian transport system. Responsible for the development and implementation of a general infrastructure investment model to support strategic planning and decision-making.

DESIMAL, 2009 - 2012 Comparative analysis of logistic chains, supervising PhD student

FlagShip, 2009 - 2010 Hull Health Advisor Program: Applied modern IT technologies to support maintenance planning for ships. Developed the 3D visualization of hull structures and components using Java3D for interactive inspection and analysis.

TurboRouter Qatar, 2010-2011 Conducted trial implementations of tree search algorithms and evaluated heuristics based on Lagrangian relaxation for ship assignment optimization.

Port Simulation, 2011 Developed a simulation model of a container terminal in

ExtendSim, in close collaboration with DNV proNavis. The model was used to analyze operational vulnerabilities and identify areas most susceptible to potential terrorist attacks.

MarRisk, 2011 Calculated the impact of wave-induced resistance on ship speed under constant power propulsion. Contributed to the development of a general framework for fleet size and mix optimization, and provided support to a PhD student working in the area.

IDEAS, 2011-2013 Implementation of a performance analysis tool based on logistics profiles, weather information and hydrodynamic properties of ships.

NOFO, 2012 Developed the geography module for a larger preparedness tool designed to support response planning in the event of oil-related maritime accidents.

SeaWeed Energy, 2013 – 2014 developing logistics model for benchmarking different solutions for seaweed farming and harvesting.

FarOff, 2013 – 2014 Integrated a Mosel optimization program with Excel, focusing on user interface development and enhancing the robustness and usability of the application.

Analysis of full-skala measurements of a drill riser, fall 2013 Analyzed accelerator measurements using Principal Component Analysis (PCA) and Fast Fourier Transform (FFT) techniques.

ALEX Provided support for satellite orbit calculations using SDP4 and SGP8 models. Implemented orthogonal projection and visualized Earth coverage using C# and overlay techniques for enhanced visualization.

LEANWIND support with project management routines.

LIFES50+ Designed the logo and established the web presence, including the creation of a custom WordPress theme. Set up PHP-MySQL packages for internal project sites used for discussions and project management, and developed Word templates to streamline documentation.

VISTA Developed a workbench based on Eclipse RCP e4, implementing plugins for scenario editing, weather data retrieval, and long-term discrete event simulation.

SmartMaritime Reimplemented the VISTA workbench as a general Eclipse p2-enabled platform. Developed plugins for route visualization and editing, access to weather data, and performing general calculations.

Automated Testing Led the automation of functionality and regression testing at Gintel, implementing tests within a Docker Compose environment. This approach streamlined the testing process and enhanced reliability across system components.

Participated in the **commissioning** of a platform at Gintel for Client 1, where I contributed to the development of support scripts for file distribution, backups, and related tasks. Assisted in debugging and error reporting, and developed Salt scripts for deployments. Played an active role in resolving several critical issues.

Contributed to the **VNF project** at Gintel for Client 2, where I was solely responsible for the installation of the OpenStack environment and the commissioning of CBAM. Led the development of VNFs, including the creation of all templates and scripts to ensure seamless integration and functionality.

Ansible at Gintel for client 2. Development of all Ansible scripts and templates for all components delivered by Gintel.

Diameter Implemented the location information lookup system for Clients 1 and 2, ensuring accurate and efficient data retrieval.

Helseplattformen As a senior developer on the new team in Trondheim, I contributed to simplifying the migration solution. This included enhancing and correcting SSIS flow components, implementing SQL-CLR functions, and developing standalone programs for document conversion and HL7-MLLP client integration. I also created several auxiliary tools to streamline workflows and reduce operational workload.

Equinor Engaged as a tester on a short-term assignment to support the Echo3D team by increasing testing capacity. Echo3D is a component of a digital twin solution that provides users with streamlined access to electronic documentation. The team is responsible for both 3D model visualization and integration with related system components. Responsibilities included executing software tests, contributing to CI/CD pipeline development, and providing technical assistance as required.

Publications and research results

The Cristin system <http://www.cristin.no> shows my research results in <https://app.cristin.no/persons/show.jsf?id=30343>. The list also contains presentations and joint work with students.

Please note that the page on *cristin.no* shows my last research position, not the current employer.